United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E.
Aberdeen, South Dakota 57401

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DESCRM
MC-208

NOV 05 2010

MEMORANDUM

TO: Superintendent, Fort Berthold Agency

FROM: Regional Director, Great Plains Region

SUBJECT: Environmental Assessment and Finding of No Significant Impact

In compliance with the regulations of the National Environmental Policy Act (NEPA) of 1969, as amended, for three proposed exploratory drilling wells by Petro-Hunt on the Fort Berthold Reservation, an Environmental Assessment (EA) has been completed and a Finding of No Significant Impact (FONSI) has been issued.

All the necessary requirements of the National Environmental Policy Act have been completed. Attached for your files is a copy of the EA, FONSI and Notice of Availability. The Council on Environmental Quality (CEQ) regulations require that there be a public notice of availability of the FONSI (1506.6(b)). Please post the attached notice of availability at the Agency and Tribal buildings for 30 days.

If you have any questions, please call Marilyn Bercier, Regional Environmental Scientist, Division of Environment, Safety and Cultural Resources Management, at (605) 226-7656.

Attachment

cc: Tex Hall, Chairman, Three Affiliated Tribes (with attachment)
Perry "No Tears" Brady, THPO (with attachment)
Derek Enderud, BLM, Dickenson, ND (with attachment)
John Shelman, US Army Corps of Engineers
Jeffrey Hunt, Virtual One Stop Shop

Finding of No Significant Impact
Petro-Hunt, LLC

Three Bakken Exploratory Oil Wells: Fort Berthold #148-94-19D-18-1H, Fort Berthold #148-94-30A-31-1H, and Fort Berthold #148-94-29B-32-1H

Fort Berthold Indian Reservation
Dunn County, North Dakota

The U.S. Bureau of Indian Affairs (BIA) has received a proposal for three oil/gas wells, access roads and related infrastructure on the Fort Berthold Indian Reservation to be located in SE1/4 SE1/4, Section 19, Township (T) 148 North (N), Range (R) 94 West (W), Dunn County, North Dakota and SW1/4 SW1/4, Section 20, T148N, R94W, Dunn County, North Dakota. Associated federal actions by BIA include determinations of effect regarding cultural resources, approvals of leases, rights-of-way and easements, and a positive recommendation to the Bureau of Land Management regarding the Applications for Permit to Drill.

The potential of the proposed actions to impact the human environment is analyzed in the attached Environmental Assessment (EA), as required by the National Environmental Policy Act. Based on the recently completed EA, I have determined that the proposed projects will not significantly affect the quality of the human environment. No Environmental Impact Statement is required for any portion of the proposed activities.

This determination is based on the following factors:

1. Agency and public involvement was solicited and environmental issues related to the proposal were identified.

2. Protective and prudent measures were designed to minimize impacts to air, water, soil, vegetation, wetlands, wildlife, public safety, water resources, and cultural resources. The remaining potential for impacts was disclosed for both the proposed action and the No Action alternative.

3. Guidance from the U.S. Fish and Wildlife Service has been fully considered regarding wildlife impacts, particularly in regard to threatened or endangered species. This guidance includes the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) (MBTA), the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) (NEPA), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) (BGEPA), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds", and the Endangered Species Act (16 U.S.C. 1531 et seq.) (ESA).

4. The proposed actions are designed to avoid adverse effects to historic, archaeological, cultural and traditional properties, sites and practices. Compliance with the procedures of the National Historic Preservation Act is complete.

5. Environmental justice was fully considered.

6. Cumulative effects to the environment are either mitigated or minimal.

7. No regulatory requirements have been waived or require compensatory mitigation measures.

8. The proposed projects will improve the socio-economic condition of the affected Indian community.

Regional Director

11/5/10
Date

ENVIRONMENTAL ASSESSMENT

United States Department of the Interior
Bureau of Indian Affairs

Great Plains Regional Office
Aberdeen, South Dakota

Cooperating Agency:

Bureau of Land Management

North Dakota State Office
Dickinson, North Dakota

Petro-Hunt, LLC

Three Forks Exploratory Oil Wells:

Fort Berthold #148-94-19D-18-1H, Fort Berthold #148-94-30A-31-1H, and Fort Berthold #148-94-29B-32-1H

Fort Berthold Indian Reservation

November 2010

For information contact:
Bureau of Indian Affairs, Great Plains Regional Office
Division of Environment, Safety and Cultural Resources Management
115 4th Avenue SE, Aberdeen, South Dakota 57401 (605) 226-7656

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Petro-Hunt, LLC (Petro-Hunt) has acquired the lease and is proposing to drill three horizontal oil and gas wells on the Fort Berthold Indian Reservation (Reservation) to evaluate and possibly develop the commercial potential of natural resources. Development has been proposed on lands held in trust by the United States in Dunn County, North Dakota. The Bureau of Indian Affairs (BIA) is the surface management agency for potentially affected tribal lands and individual allotments. The BIA manages lands held in title by the tribe and tribal members to subsurface mineral rights. Development has been proposed in locations that target specific areas in the Three Forks Formation, a known oil reserve. The following proposed well sites, shown in Figures 1 and 2, will be located within the Reservation:

- **Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H:** SE1/4 SE1/4, Section 19, Township (T) 148 North (N), Range (R) 94 West (W), Dunn County, North Dakota
- **Fort Berthold #148-94-29B-32-1H:** SW1/4 SW1/4, Section 20, T148N, R94W, Dunn County, North Dakota

A new access road will be constructed to facilitate the construction and operation of each proposed well pad. Each well pad will be constructed to accommodate drilling activities and well operations. A semi-closed loop drilling system is required for the Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H well pad and the Fort Berthold #148-94-29B-32-1H well pad. All pits will be constructed for drilled cuttings only and used during drilling operations. All drilling fluids will be safely evacuated from the site. The constructed pits will be reclaimed once drilling operations have ceased. Should the proposed well sites result in long-term commercial production, supporting facilities may be constructed on site. All components (e.g., road, well pad, supporting facilities) will be reclaimed upon final abandonment unless formally transferred, with federal approval, to either the BIA or the landowner. The proposed wells are exploratory; should they prove productive, further exploration of surrounding areas is possible. This environmental assessment (EA) addresses the potential impacts associated with the construction and possible long-term operation of the above-listed wells and directly related infrastructure and facilities. Further oil and gas exploration and development will require additional National Environmental Policy Act (NEPA) analysis and federal actions.

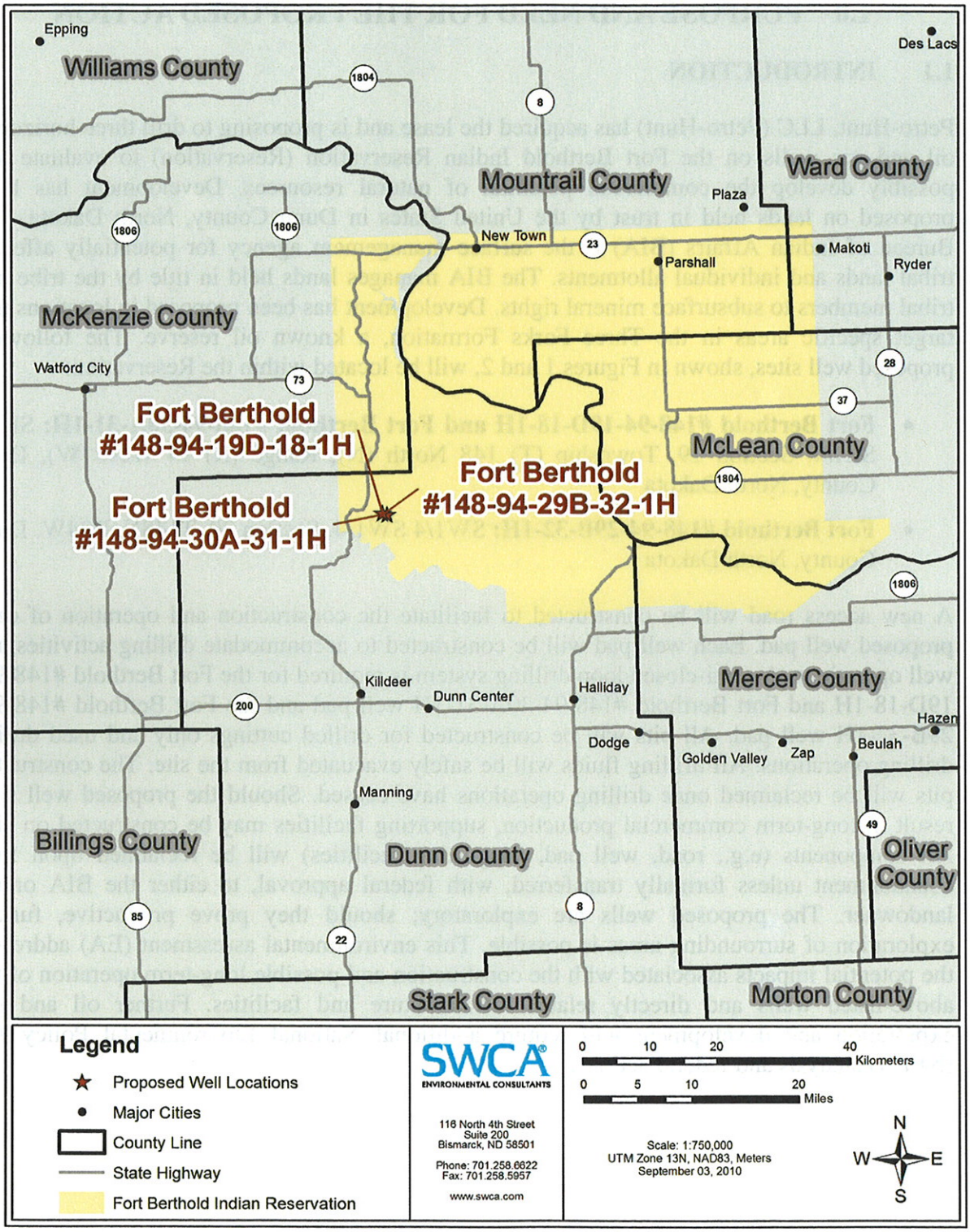

Figure 1. Project location map.

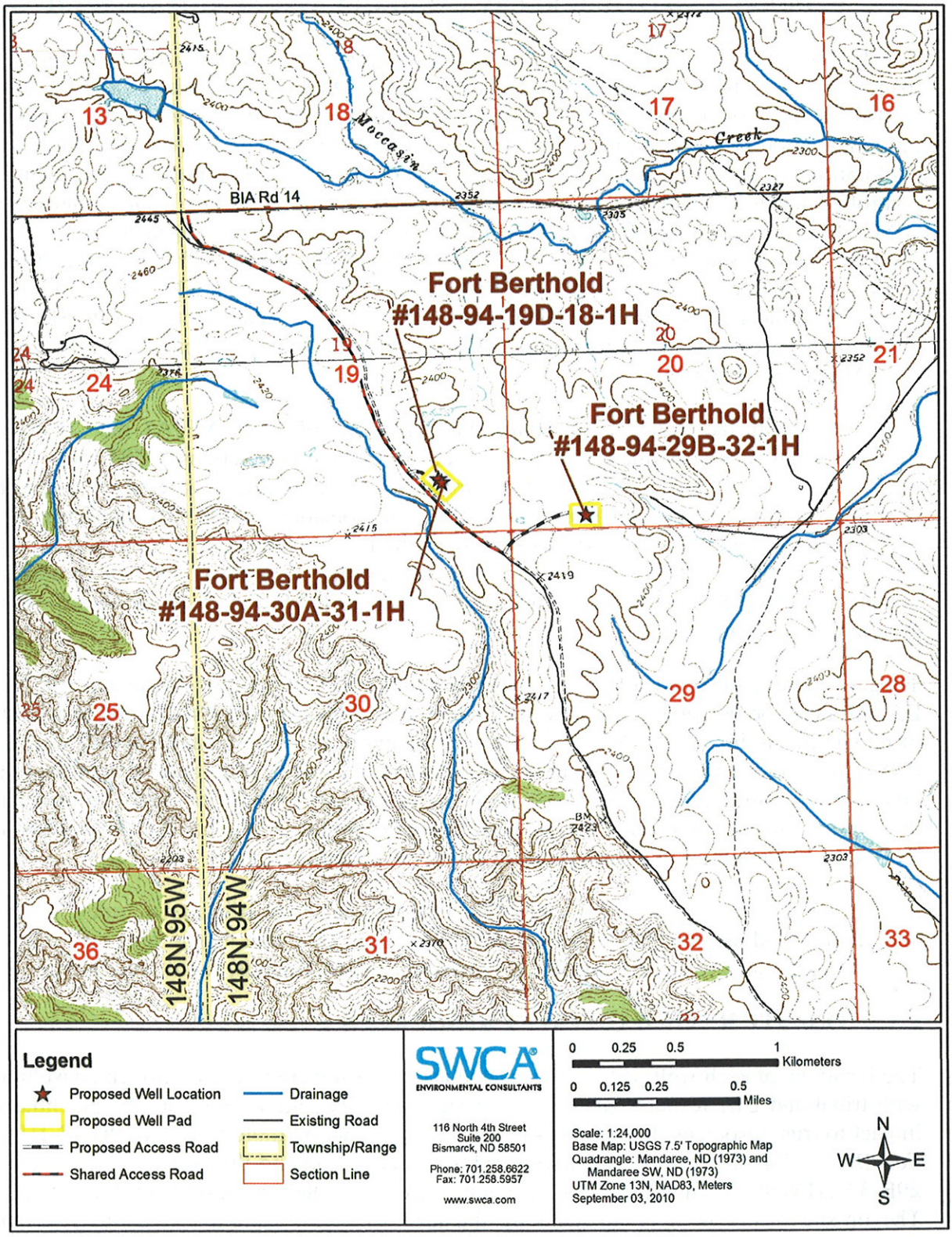

Figure 2. Petro-Hunt 3-Well proposed locations.

1.2 FEDERAL AND OTHER RELEVANT REGULATIONS AND AUTHORITIES

The BIA's general mission is to represent the interests, including the trust resources, of members of the Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara (MHA Nation), as well as those of individual tribal members. All members of the MHA Nation, including individual allotment owners, may benefit economically from the development of oil and gas exploration on the Reservation. Oil and gas exploration and subsequent development are controlled under the authority of the Energy Policy Act of 2005 (42 United States Code [USC] 15801, et seq.), the Federal Onshore Oil and Gas Royalty Management Act of 1982 (30 USC 1701, et seq.), the Indian Mineral Development Act of 1982 (25 USC 2101, et seq.), and the Indian Mineral Leasing Act of 1938 (25 USC 396a, et seq.). The BIA's role in the proposed project includes approving easements, leases, and rights-of-way (ROWs); determining effects on cultural resources; and making recommendations to the Bureau of Land Management (BLM).

Compliance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations (Title 40 Code of Federal Regulations [CFR] 1500–1508), 43 CFR 3100, and Onshore Oil and Gas Order Nos. 1, 2, 6, and 7 is required due to the project's location on federal lands. The BLM is responsible for the final approval of all applications for permit to drill (APDs) after receiving recommendations for approval from the BIA. The BLM is also tasked with on-site monitoring of construction and production activities as well as resolution of any dispute that may arise as a result of any of the aforementioned actions.

The procedures and technical practices described in the APD supporting documents and in the EA will describe potential impacts to the project area. This EA will result in either a finding of no significant impact (FONSI) or in the preparation of an environmental impact statement (EIS). Commercial viability of the proposed wells could result in additional exploration in the area. Should future oil/gas exploration activities be proposed wholly or partly on trust land, those proposals and associated federal actions would require additional NEPA analysis and BIA consideration prior to implementation and/or production activities.

Petro-Hunt will comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. No disturbance of any kind can begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place.

1.3 ON-SITE REVIEW OF TRUST RESOURCES

The locations of each well pad and associated access road were selected through consultation with tribal and BIA resource managers in order to reduce and/or eliminate the potential for impact to trust resources. EA on-site meetings for the Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H well pad and access road and the Fort Berthold #148-94-29B-32-1H well pad and access road locations were conducted on May 12 and June 25, 2010. The on-site meetings were attended by the land surveyor, natural and cultural resource specialists, a BIA representative, and a Tribal Historic Preservation Office (THPO) monitor. Surveys were conducted to identify and subsequently mitigate the affect of the proposed

action on cultural, archaeological, and natural (i.e., biological and physical) resources. Additionally, topography, pollutant transport via drainage features, erosion control measures, as well as pad and related facility locations (topsoil/subsoil stockpiles, reserve pits, tanks, etc.) were assessed.

2.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

The BIA, as directed by NEPA, must "study, develop, and describe appropriate alternatives to the recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources..." (NEPA Sec 102[2][e]). Developing a range of alternatives allows for exploration of options designed to meet the purpose and need for the action. Along with the No Action Alternative, the BIA is considering the Proposed Action.

2.1 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed project (including the well pads, wells, and access roads) would not be constructed, drilled, installed, or operated. The BIA would not approve easements, leases, or ROWs for the proposed locations and the BLM would not approve the APDs. No impacts would occur as a result of this project to the following critical elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice. There would be no project-related ground disturbance, use of hazardous materials, or trucking of product to collection areas. Surface disturbance, deposition of potentially harmful biological material, and traffic levels would not change from present levels. Under the No Action Alternative, the MHA Nation, tribal members, and allottees would not have the opportunity to realize potential financial gains from the discovery and resulting development of resources at these well locations.

2.2 THE PROPOSED ACTION

This document analyzes the potential impacts of three exploratory oil and gas wells with varied surface and mineral estates located in the southwestern portion of the Reservation in Dunn County. The proposed wells would test the commercial potential of the Three Forks Formation

2.2.1 Field Camp

A few personnel would be housed in self-contained trailers for a very short period of time. Long-term housing is not being proposed. Most personnel, both construction and drilling, would commute to the site. Human waste would be collected on site in portable toilets and trailers and transported off site to a state-approved wastewater treatment facility. All other solid waste would be enclosed in containers and transported to, and disposed of at state-approved facilities.

2.2.2 Access Roads

Up to 8,400 feet (i.e., 1.6 miles) of new access roads would be constructed. A maximum disturbed ROW width of 66 feet for the access roads would result in up to 12.7 acres of new surface disturbance. Signed agreements would be in place allowing road construction across affected private and allotted land surfaces, and any applicable approach permits and/or easements would be obtained prior to any construction activity.

Construction would follow road design standards outlined in the BLM Gold Book (BLM and U.S. Forest Service [USFS] 2007). At a minimum, 6 inches of topsoil would be removed from the access road corridors. This stockpiled topsoil would then be placed on the outside slopes of the ditches following road construction. The ditches would be reseeded as quickly as possible using a seed mixture determined by the BIA. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that may exist along BIA Road 14. The access roads would be surfaced with a minimum of 4 inches of aggregate if the sites are to be established as commercial production sites and the roadway would remain in use for the life of the wells. Details of road construction are addressed in the APD. A diagram of typical road cross sections is provided as Figure 3.

2.2.3 Well Pad

Each proposed well pad would include a leveled area (pad) and a pit. The pads would be used for the drilling rig and equipment, and the pits would be excavated, lined, and used for semi-dry cuttings. Fluids will not be stored in the pits except for during times of emergency or precipitation events. Free fluids located in the pits must be immediately removed. The pads would be stripped of topsoil and vegetation and then graded. Vegetation would be ground into mulch and mixed with the topsoil. The topsoil would then be stockpiled and stabilized with a cover crop until it could be used to reclaim and revegetate the disturbed area. The subsoils would be used in the construction of the pads and would be graded to ensure that water drains away from the pads. Erosion control best management practices (BMPs) would be implemented and could include surface drainage controls, soil surface protection methodologies, and sediment capture features.

The dual well pad would measure approximately 350 by 525 feet (4.2 acres) and the single well pad would measure approximately 350 by 470 feet (3.8 acres). Cut-and-fill slopes, stockpiled topsoil, and reserve pit backfill placed on the edge of the pads would result in approximately 1.2 acres of additional surface disturbance per pad, resulting in a total surface disturbance of 10.4 acres at the well pads. Details of pad construction and reclamation can be found in the APD.

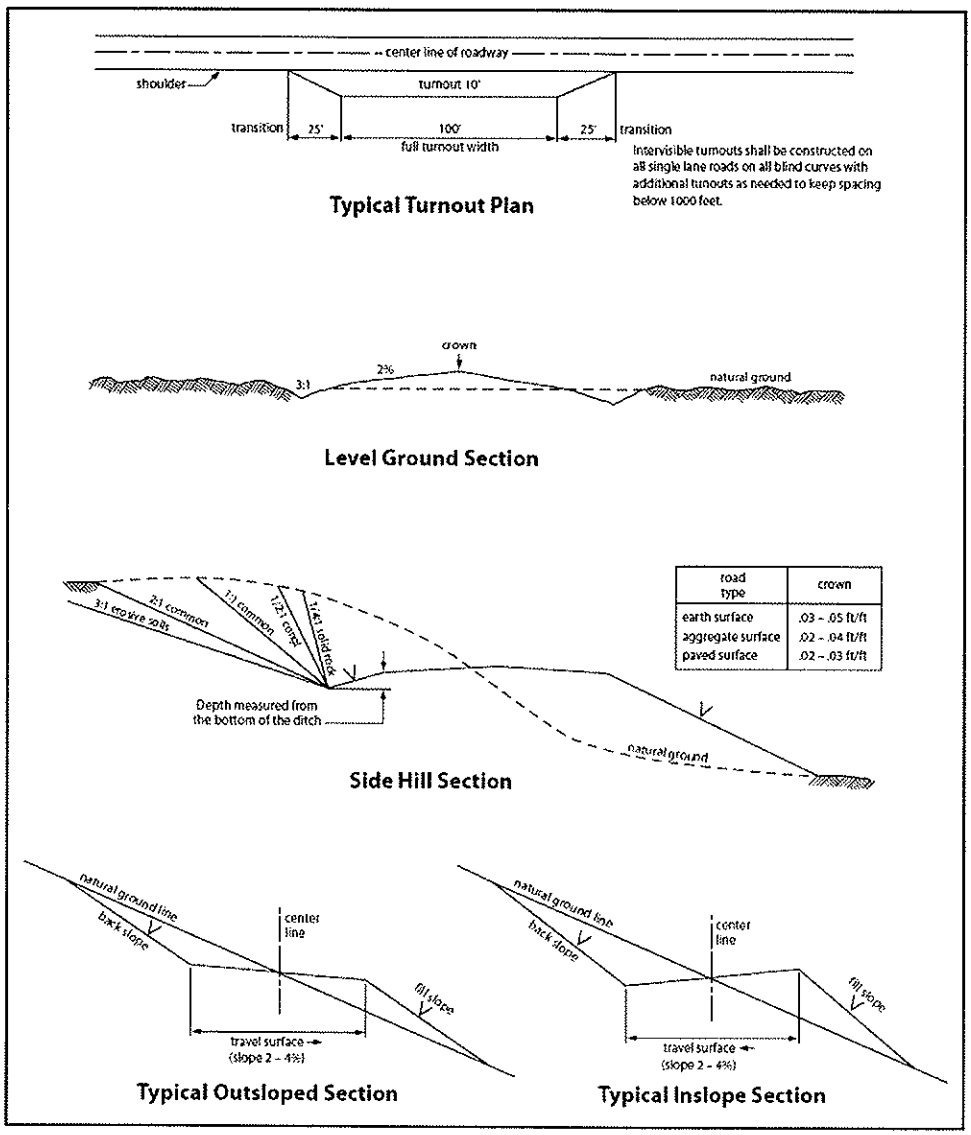

Figure 3. Typical road cross sections (BLM and USFS 2007).

2.2.4 Drilling

After securing mineral leases, Petro-Hunt submitted the Notice of Staking (NOS) or Application for permit to Drill (APD) to the BLM on the following dates:

- NOS: Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H: August 11, 2010
- APD: Fort Berthold #148-94-29B-32-1H: August 3, 2010

The BIA's office in New Town, North Dakota, will receive a copy of the APD from the BLM North Dakota Field Office. Construction will begin when the BIA completes the NEPA process and the APD is then approved by the BLM.

Rig transport and on-site assembly would take approximately five days for each well; a typical drill rig is shown in Figure 4. Drilling would require approximately 35 days to reach target depth, using a rotary drilling rig rated for drilling to approximately 30,000 feet. For the first 2,200 feet drilled, a freshwater-based mud system with non-hazardous additives would be used to minimize contaminant concerns. Water would be obtained from a commercial source for this drilling stage, using approximately 50 gallons of water per foot of hole drilled.

After setting and cementing the near-surface casing, an oil-based mud system (80% to 85% diesel fuel and 15% to 20% water) would be used to drill to a 7-inch casing point. Oil-based drilling fluids reduce the potential for hole sloughing while drilling through water-sensitive formations (shales). Approximately 9,000 gallons of water and 25,000 gallons of diesel fuel per well would be used to complete vertical drilling. The lateral reach of the borehole would be drilled using 85,000 gallons of fresh water as mud and adding polymer sweeps as necessary to clean the hole.

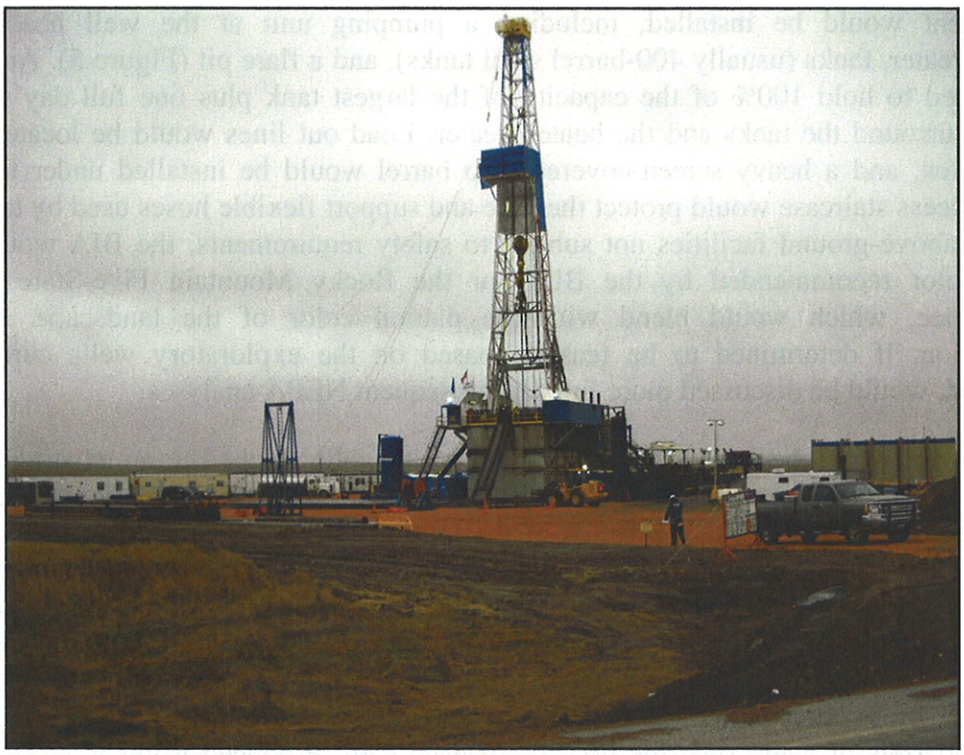

Figure 4. Typical drilling rig (Ruffo 2009).

2.2.5 Casing and Cementing

Surface casing would be set at an approximate depth of 2,500 feet and cemented back to the surface during drilling, isolating all near-surface freshwater aquifers in the project area. The Fox Hills Formation and Pierre Formation would be encountered at depths of approximately 1,500 feet. Production casing would be cemented from a depth of approximately 10,800 feet to a depth of about 4,000 feet in order to isolate the hydrocarbon zone. Casing and cementing operations would be conducted in full compliance with Onshore Oil and Gas Order No. 2 (43 CFR 3160).

2.2.6 Completion Activities

A completion rig unit would be moved on-site following the conclusion of drilling and casing activities. Approximately 30 days is usually required, at the proposed well depth, to clean out the well bore, pressure test the casing, perforate and fracture the horizontal portion of the hole, and run production tubing for commercial production. The typical procedure for fracturing a target formation to increase production includes pumping a mixture of sand and a carrier (i.e., water and/or nitrogen) downhole under extreme pressure. The resulting fractures are propped open by the sand, increasing the capture zone of the well and subsequently maximizing the efficient drainage of the field. After fracturing, the wells are "flowed back" to the surface where fracture fluids are recovered and disposed of in accordance with North Dakota Industrial Commission (NDIC) rules and regulations.

2.2.7 Commercial Production

If drilling and testing support commercial production from the proposed locations, additional equipment would be installed, including a pumping unit at the well head, a vertical heater/treater, tanks (usually 400-barrel steel tanks), and a flare pit (Figure 5). An impervious dike sized to hold 100% of the capacity of the largest tank plus one full day's production would surround the tanks and the heater/treater. Load out lines would be located inside the diked area, and a heavy screen-covered drip barrel would be installed under the outlet. A metal access staircase would protect the dike and support flexible hoses used by tanker trucks. For all above-ground facilities not subject to safety requirements, the BIA would choose a paint color recommended by the BLM or the Rocky Mountain Five-State Interagency Committee, which would blend with the natural color of the landscape. Commercial production, if determined to be feasible based on the exploratory wells currently being analyzed, would be discussed more fully in subsequent NEPA analyses.

Initially, oil would be collected in tanks and periodically trucked to an existing oil terminal for sales. Any produced water would be captured in tanks and periodically trucked to an approved disposal site. The frequency of trucking activities for both oil and produced water would depend upon volumes and rates of production. The duration of production operations cannot be reliably predicted, but some oil wells have pumped for more than 100 years. The operator estimates that each well would yield approximately 100 million barrels of oil and 25 million barrels of water during the first year of production. After the first year, the operator estimates production would decrease to approximately 300 million barrels of oil and 60 million barrels of water over the lifetime of each well. Produced water is mostly recovered frac fluid and is expected to become minimal after two years. In the future, Petro-Hunt would complete a ROW application for oil and water pipelines and for an electric line, all of which would be located within existing disturbance along access and arterial roads.

Figure 5. Typical producing oil well pad (Sobotka 2008).

Large volumes of gas are not expected from the locations. Small volumes would be flared in accordance with Notice to Lessees (NTL) 4A and adopted NDIC regulations, which prohibit unrestricted flaring for more than the initial year of operation (North Dakota Century Code [NDCC] 38-08-06.4).

2.2.8 Construction Details at the Well Sites

Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H (Dual Pad)
The proposed Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad site, shown in (Figure 6), is located approximately 8 miles southwest of Mandaree in the SE¼ SE¼ of Section 19, T148N, R94W, Dunn County, North Dakota. A new access road approximately 6,085 feet long would be constructed from BIA Road 14 (Figures 7 and 8) to the well pad (see Figure 6). The new road would disturb approximately 9.2 acres and the proposed dual well pad would disturb approximately 4.2 acres; the total anticipated new disturbance would be 13.4 acres.

The spacing unit of each well consists of 1,280 acres (+/-) with the bottom hole for the Fort Berthold #148-94-19D-18-1H well located in the N½ NE¼ of Section 18, T148N, R94W (Figure 9), and the bottom hole for the Fort Berthold #148-94-30A-31-1H well located in the S½ SE¼ of Section 31 T148N, R94W (Figure 10).

Vertical drilling for the Fort Berthold #148-94-19D-18-1H well would be completed at approximately 9,176 feet, at which point drilling would turn roughly horizontal to an approximate total vertical depth (TVD) of 11,137 feet and total measured depth (TMD) of 20,582 feet. The complete drilling string would measure approximately 20,582 feet, including approximately 9,176 feet of lateral reach into the Three Forks Formation. The drilling target is

located approximately 867 feet from the north line and 1,220 feet from the east line, and approximately 9,437 feet north of the surface hole location. A north/south setback of 250 feet from the section line and an east/west setback of 1,220 feet from the section line would be maintained.

Vertical drilling for the Fort Berthold #148-94-30A-31-1H well would be completed at approximately 10,656 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 11,133 feet and TMD of 22,196 feet. The complete drilling string would measure approximately 22,196 feet, including approximately 10,793 feet of lateral reach into the Three Forks Formation. The drilling target is located approximately 814 feet from the south line and 1,220 feet from the east line, and approximately 11,123 feet south of the surface hole location. A north/south setback of 250 feet from the section line and an east/west setback of 1,220 feet from the section line would be maintained.

Figure 6. Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad location facing west from center.

Figure 7. Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H access road facing southeast toward dual well pad.

Figure 8. Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H well pad access road facing southeast toward Section 19.

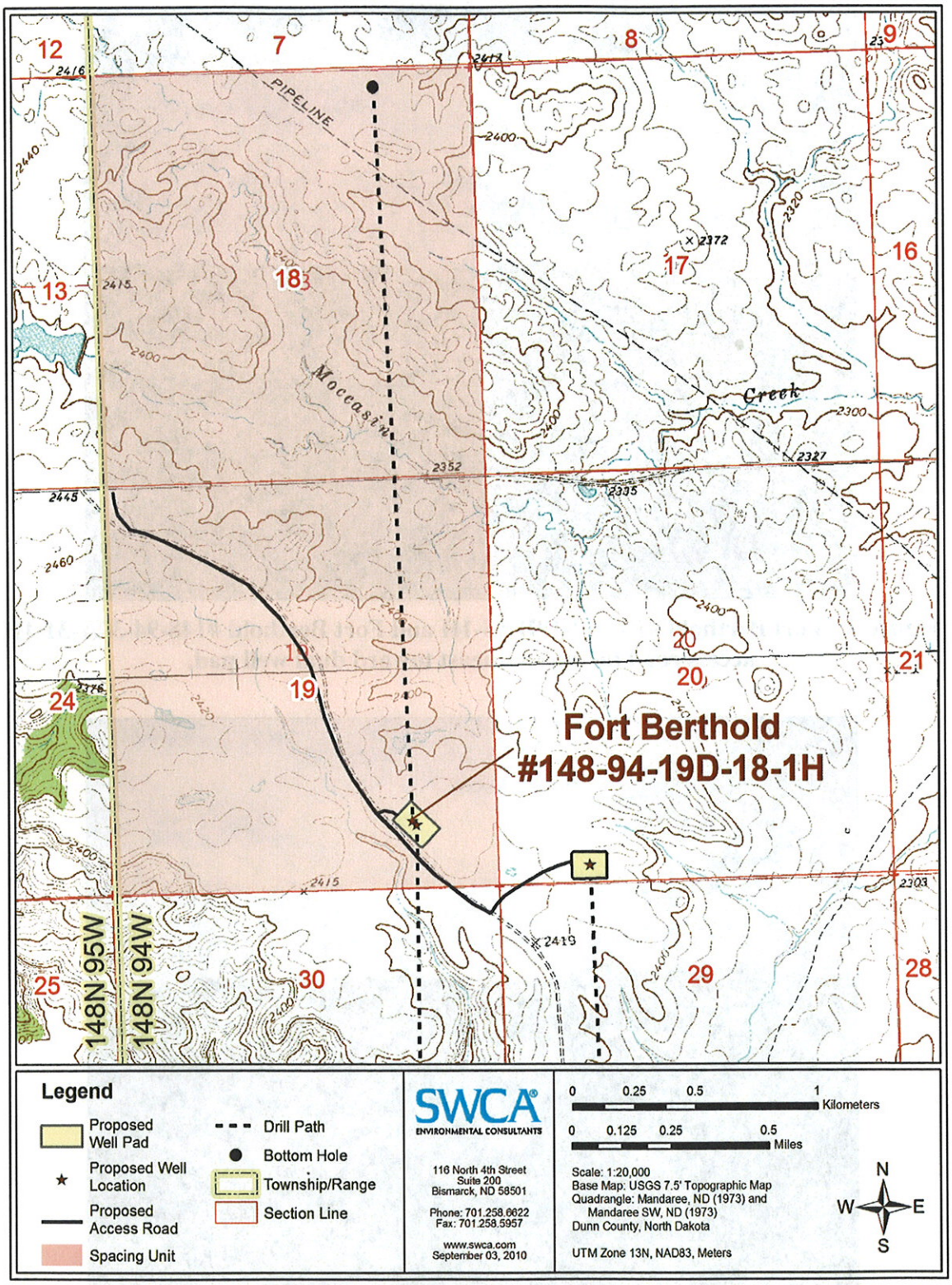

Figure 9. Proposed well pad and access road locations showing spacing unit and drilling target.

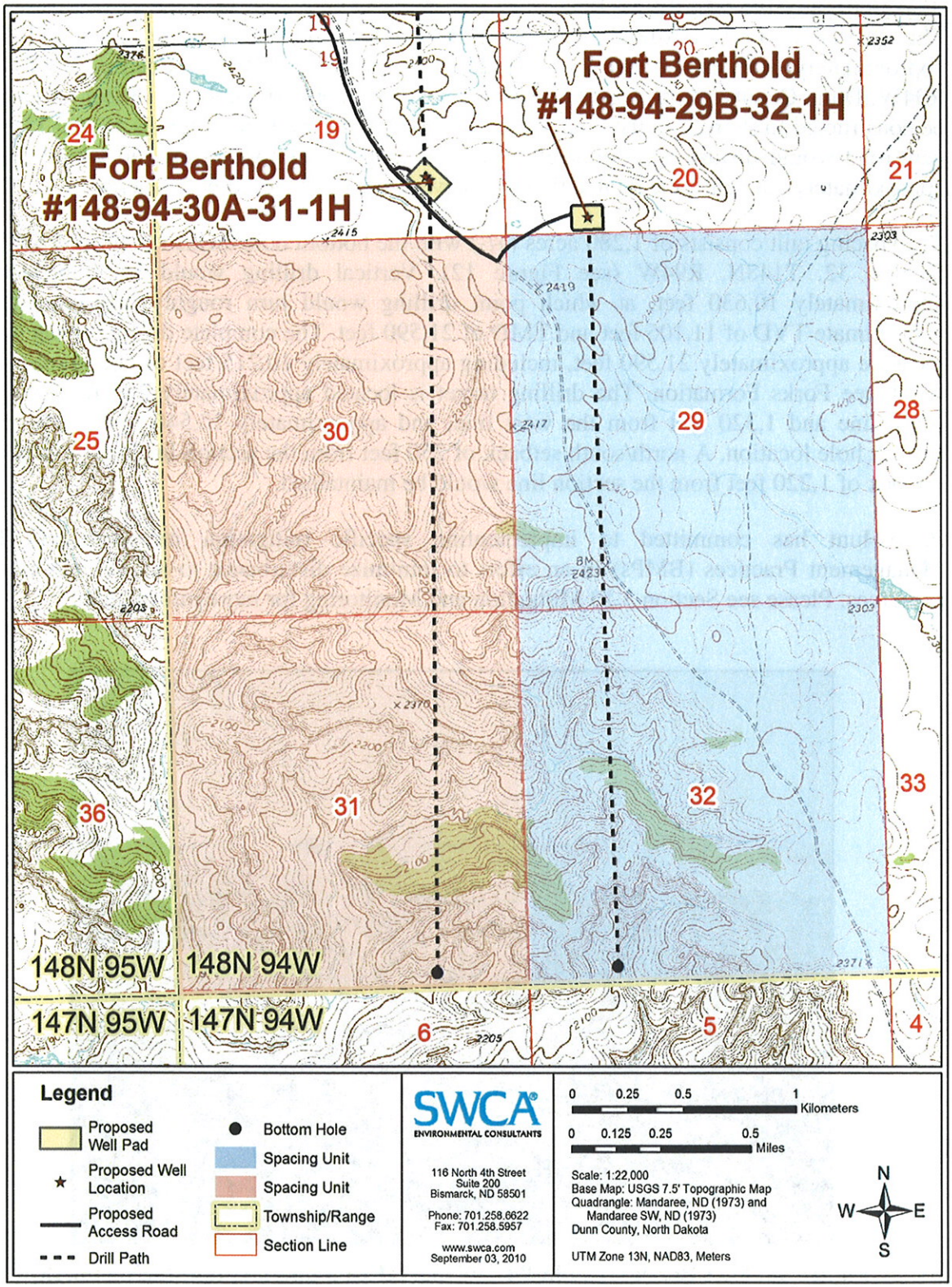

Figure 10. Proposed well locations showing spacing unit and drilling target.

Fort Berthold #148-94-29B-32-1H

The proposed Fort Berthold #148-94-29B-32-1H well site (Figure 11) is located approximately 8 miles southwest of Mandaree in the SW¼ SW¼ of Section 20, T148N, R94W, Dunn County, North Dakota. A new access road approximately 2,513 feet long would be constructed to stem from the dual pad access road to the well site (Figures 12 and 13). The new road would disturb approximately 3.8 acres and the proposed well pad would disturb approximately 3.8 acres; the total anticipated new disturbance would be 7.6 acres.

The spacing unit consists of 1,280 acres (+/-) with the bottom hole located in the S½ SW¼ of Section 32, T148N, R94W (see Figure 12). Vertical drilling would be completed at approximately 10,630 feet, at which point drilling would turn roughly horizontal to an approximate TVD of 11,106 feet and TMD of 21,590 feet. The complete drilling string would measure approximately 21,590 feet, including approximately 10,215 feet of lateral reach into the Three Forks Formation. The drilling target is located approximately 250 feet from the south line and 1,320 feet from the west line, and approximately 10,540 feet south of the surface hole location. A north/south setback of 250 feet from the section line and an east/west setback of 1,220 feet from the section line would be maintained.

Petro-Hunt has committed to implementing specific mitigation measures and Best Management Practices (BMPs) in an effort to minimize disturbance to natural and cultural resources. Please see Section 3.10 Mitigation and Monitoring for more information.

Figure 11. Fort Berthold #148-94-29B-32-1H well pad location facing north.

Figure 12. Fort Berthold #148-94-29B-32-1H access road location facing southwest.

Figure 13. Fort Berthold #148-94-29B-32-1H well pad access road facing southeast toward Section 20.

2.2.9 Reclamation

Interim Reclamation

Interim reclamation would consist of reclaiming all areas not needed for production operations for the life of a well. Immediately after well completion, all equipment and materials unnecessary for production operations would be removed from a location and surrounding area. The corners of each well pad would be rounded to facilitate interim reclamation. The reserve pit and drill cuttings would be treated, solidified, backfilled, and buried as soon as possible after well completion. Cuttings would be mixed with a non-toxic reagent resulting in an irreversible reaction to produce an inert, solid material. Any oil residue would be dispersed and captured, preventing coalescence and release to the environment at significant rates. The alkaline nature of the stabilized material also chemically stabilizes various metals that may be present, primarily by converting them into less soluble compounds. The treated material would then be buried in the reserve pit, and overlain by at least 4 feet of overburden as required by adopted NDIC regulations. The surface above the reserve pit would be seeded to re-establish native/desired vegetation. Topsoil would be spread along a road's cut and fill slopes.

If commercial production equipment is installed, the dual pad would be reduced in size to approximately 225 by 400 feet (2.07 acres) and the single well pad would be reduced in size to approximately 250 by 400 feet (2.3 acres); portions of the well pads not needed for production would be recontoured, covered with 6 inches of topsoil, and reseeded using methods and seed mixtures determined by the BIA.

The working area of each well pad and the running surface of access roads would be surfaced with scoria or crushed rock obtained from a previously approved location. The outslope portions of roads would be covered with stockpiled topsoil and reseeded with a seed mixture determined by the BIA, reducing the residual access-related disturbance to a width of approximately 28 feet. Petro-Hunt would control noxious weeds within the ROW, well pads, or other applicable facilities by approved chemical or mechanical methods.

Final Reclamation

Final reclamation would occur either in the very short term if the proposed wells are commercially unproductive, or later upon final abandonment of commercial operations. All disturbed areas would be reclaimed, reflecting the BIA view of oil and gas exploration and production as temporary intrusions on the landscape. All facilities would be removed, well bores would be plugged with cement, and dry hole markers would be set. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and reseeded. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. Figure 14 shows an example of reclamation (BLM and USFS 2007).

The well pad and access road are constructed to the minimum size necessary to safely conduct drilling and completion operations.

The well pad and access road have been recontoured back to the original contour, the topsoil respread, and the site revegetated.

Figure 14. Example of reclamation from the BLM Gold Book (BLM and USFS 2007).

2.3 BIA-PREFERRED ALTERNATIVE

The BIA-preferred alternative is to complete all administrative actions and approvals necessary to authorize or facilitate oil and gas developments at the proposed well locations.

3.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The Reservation is the home of the MHA Nation. Located in west-central North Dakota, the Reservation encompasses more than one million acres, of which almost half are held in trust by the United States for either the MHA Nation or individual allottees. The remainder of the land is owned in fee simple title, sometimes by the MHA Nation or tribal members, but usually by non-Indians. The Reservation occupies portions of six counties, including Dunn, McKenzie, McLean, Mercer, Mountrail, and Ward. In 1945, the Garrison Dam was completed, inundating much of the Reservation. The remaining land was divided into three sections near Lake Sakakawea, an impoundment of the Missouri River upstream of the Garrison Dam.

The proposed wells and access roads are geologically situated in the Williston Basin, where the shallow structure consists of sandstones, silts, and shales dating to the Tertiary period (65 to 2 million years ago), including the Sentinel Butte and Golden Valley formations. The underlying Three Forks Formation is a known source of hydrocarbons and is the target of the Proposed Action. Although earlier oil/gas exploration activity in the Reservation was limited and commercially unproductive, recent economic changes and technological advances now make accessing oil in the Three Forks Formation feasible.

The Reservation is within the northwestern Great Plains ecoregion, which consists of four physiographic units: 1) the Missouri Coteau Slope north of Lake Sakakawea; 2) the Missouri River trench (not flooded); 3) the Little Missouri River badlands; and 4) the Missouri Plateau south and west of Lake Sakakawea (Williams and Bluemle 1978). Much of the Reservation is on the Missouri Coteau Slope. Elevations of the glaciated, gently rolling landscape range from a normal pool elevation of 1,838 feet at Lake Sakakawea to more than 2,600 feet on Phaelan's Butte near Mandaree. Annual precipitation on the plateau averages between 15 and 17 inches. Mean temperatures fluctuate between -3 and 21 degrees Fahrenheit (°F) in January and between 55°F and 83°F in July, with 95 to 130 frost-free days each year (Bryce et al. 1998; High Plains Regional Climate Center 2008).

The proposed well sites and spacing units are in a rural area consisting of mostly grassland, shrubland, and cropland that is currently farmed, idle, or used to graze livestock. The landscape has been previously disturbed by dirt trails and gravel and paved roadways.

The broad definition of the human and natural environment under NEPA leads to the consideration of the following elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice. Potential impacts to these elements are analyzed for both the No Action Alternative (described in Section 2.1) and the Proposed Action. Impacts may be beneficial or detrimental, direct or indirect, and short-term or long-term. This EA also analyzes the potential for cumulative impacts, and ultimately makes a determination as to the significance of any impacts. In the absence of significant negative consequences, it should be noted that a significant benefit from the project does *not* in itself require the preparation of an EIS.

3.1 AIR QUALITY

3.1.1 Introduction

The federal Clean Air Act (CAA), as amended in 1990, established national ambient air quality standards for criteria pollutants to protect public health and welfare. It also set standards for cancer-causing compounds, regulated emissions that cause acid rain, and required federal permits for large sources. National standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. These standards were set for pervasive compounds that are generally emitted by industry or motor vehicles. Standards for each pollutant meet specific public health and welfare criteria; thus they are called the "criteria pollutants." Some states have adopted more stringent standards for criteria pollutants, or have chosen to adopt new standards for other pollutants. For instance, North Dakota has a standard for hydrogen sulfide that the Environmental Protection Agency (EPA) does not.

3.1.2 Atmospheric Stability and Dispersion, and Pollutant Concentrations

The quantity of pollutant emissions in an area and the degree to which these pollutants disperse directly affects resulting concentrations (and hence affects health). Pollutant dispersion, in turn, is directly affected by atmospheric stability. Atmospheric stability determines the amount of vertical and horizontal air exchange, or mixing, that can occur within a given air basin. Restricted mixing and low wind speeds characterize a high degree of atmospheric stability. These conditions are characteristic of temperature inversions. The height of the inversion determines the mixing volume trapped below.

Three types of temperature inversions typically occur that affect air quality: subsidence, katabatic, and radiation. A subsidence inversion occurs when a mass of aloft high-pressure (cold) air slowly sinks toward the surface. This causes the air underneath to heat as it is compressed. These subsiding layers are more stable than they were at their original higher altitudes. These inversions break up when a low-pressure front moves into the area and causes turbulence.

Katabatic inversions occur when air cooling at higher elevations (e.g., hills) slides, because it is more dense, down into valleys. This cool air in turn lifts warmer air, creating a strong boundary layer. If pollutants are emitted into the air near the surface after this inversion forms, there will be little vertical mixing until the inversion breaks. Katabatic inversions typically break when the sun warms the earth's surface and allows warmer air to float up through the boundary layer, thus creating vertical mixing.

Radiation inversions form when the lowest levels of the atmosphere are cooled by contact with the earth's surface, which cools by emitting radiation. Factors that help a radiation inversion form include calm winds, dry air, clear skies, long nights, and moist ground surface. Radiation inversions often occur in winter after rainstorms. They are often marked by strong surface fog. Like katabatic inversions, these inversions typically break up when the sun's energy penetrates to the surface, causing vertical mixing to occur.

The winds and unstable air conditions experienced during the passage of storms result in low pollutant concentrations and excellent visibility. Between winter storms, high pressure and light winds allow cold, moist air to pool on the valley floors and in low areas. This creates strong low-level temperature inversions and very stable air conditions. This situation can lead to foggy conditions. If acidic compounds such as sulfur dioxide are present, the fog may become acidic as chemicals adsorb onto water droplets. Fog measurements in some areas of the western United States have found acid levels the same as table vinegar (pH 3.5).

Conditions favorable to fog formation are also conditions favorable to high concentrations of carbon monoxide (CO) and particulate matter with particles 2.5 microns or smaller ($PM_{2.5}$). Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large quantities of emissions are occurring. The water droplets in fog, however, can act as a sink for CO and nitrogen oxide (NOx), temporarily lowering pollutant concentrations. At the same time, though, fog can also help in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of high winter $PM_{2.5}$ levels.

3.1.3 Greenhouse Gas Emissions and Climate Change

Carbon dioxide (CO_2) is the primary greenhouse gas (GHG), responsible for approximately 90% of radiative forcing (the rate of energy change as measured at the top of the atmosphere; this can be positive [warmer] or negative [cooler]). To simplify discussion of the various GHGs, the term "equivalent CO_2, or CO_2e" has been developed. CO_2e is the amount of CO_2 that would cause the same level of radiative forcing as a unit of one of the other GHGs. For example, 1 ton of methane (CH_4) has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as 1 ton of CH_4. Nitrogen dioxide has a CO_2e value of 310. Thus, control strategies often focus on the gases with the highest CO_2e value. CH_4 is a common fugitive gas emission in oil and gas fields and is emitted at many phases of exploration and production.

According to the Center for Integrative Environmental Research at the University of Maryland (2008), climate change will affect North Dakota's climate significantly over time. North Dakota will experience an increase in the unpredictability of droughts, floods, and pests making it harder for farmers to remain economically viable in the agricultural industry. This damage to the agricultural community will subsequently be a detriment to the livestock industry. Additionally, due to reductions in the amount of available wildlife habitat, including receding water levels, North Dakota's hunting, fishing, and tourism industries will be damaged.

3.1.4 Criteria Pollutants

Ozone (O_3) is a colorless gas with a pungent, irritating odor, which creates a widespread air quality problem in most of the world's industrialized areas. Ozone smog is not emitted directly into the atmosphere but is primarily formed through the reaction of hydrocarbons and nitrogen oxides in the presence of sunlight. Deleterious effects of ozone on human health can include reduced lung function; aggravated respiratory illness; and irritated eyes, nose, and

throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. Ozone can persist for many days after formation, and disperse over several hundred miles.

Respirable particulate matter is a class of compounds that can lodge deep in the lungs causing health problems. Based on extensive health studies, particulate matter is regulated under two classes. PM_{10} describes particles 10 microns or smaller, and $PM_{2.5}$ is 2.5 microns or smaller. Respirable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter.

Nitrogen dioxide (NO_2) is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months, nitrogen dioxide is a major component of photochemical smog. Nitrogen dioxide is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. Nitrogen dioxide is also involved in ozone smog production.

Carbon monoxide (CO) is a colorless, odorless gas that is a byproduct of incomplete combustion. Carbon monoxide concentrations typically peak nearest a source such as roadways or areas with high fireplace use, and decrease rapidly as distance from the source increases. Ambient levels are typically found during periods of stagnant weather, such as on still winter evenings with a strong temperature inversion. Carbon monoxide is readily absorbed into the body from the air. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure are headaches, fatigue, slow reflexes, and dizziness.

Sulfur dioxide (SO_2) is a colorless gas with a strong, suffocating odor. Sulfur dioxide is produced by burning coal, fuel oil, and diesel fuel. Sulfur dioxide can trigger constriction of the airways, causing particular difficulties for asthmatics. Long-term exposure is associated with increased risk of mortality from respiratory or cardiovascular disease. Sulfur dioxide emissions are also a primary cause of acid rain and plant damage.

The federal and state governments have set standards based on set criteria for various air pollutants caused by human activity. Table 1 summarizes the standards for these criteria pollutants.

Table 1. Air Quality Standards and Monitored Data.

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$) or (*ppm*)	Year		
			2006	2007	2008
SO_2 (in ppm)	24-hour	*0.14*	0.011	0.011	0.009
	Annual Mean	*0.03*	0.002	0.002	0.002
PM_{10} (in $\mu g/m^3$)	24-hour	150	50	57	108
	Annual Mean	50	14	13	16
$PM_{2.5}$ (in $\mu g/m^3$)	24-hour	35	18.9	13.5	16.4
	Weighted Annual Mean	15	6.3	6.6	6.7
NO_2 (in ppm)	Annual Mean	*0.053*	0.003	0.003	0.003
O_3 (in ppm)	1-hour	*0.12*	0.076	0.076	0.069
	8-hour	*0.08*	0.067	0.065	0.063

Source: EPA 2009. $\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million
Note: For $PM_{2.5}$ the fourth-highest 24-hour value is reported per EPA attainment evaluation protocol.

3.1.5 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are a class of compounds known to cause cancer, mutation, or other serious health problems. HAPs are usually a localized problem near an emission source. HAPs are regulated separately from criteria air pollutants. Several hundred HAPs are recognized by the EPA and the State of North Dakota. Health effects of HAPs may occur at exceptionally low levels; for many HAPs, it is not possible to identify exposure levels that do *not* produce adverse health effects. Major sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), wood smoke, and motor vehicle exhaust. Unlike regulations for criteria pollutants, there are no ambient air quality standards for HAPs. Examples of HAPs found in gases released by oil field development and operation include benzene, toluene, xylene, and formaldehyde (BLM 2009). HAP emissions receive evaluation based on the degree of exposure that can cause risk of premature mortality, usually from cancer.

Risk assessments express premature mortality in terms of the number of deaths expected per million persons. The North Dakota Department of Health (NDDH) typically reviews projects and either requires an applicant to prepare a risk assessment or assign the state engineers to do the work. The state requires that maximum individual cancer risk be calculated using its adopted protocol (the Determination of Compliance in the state's Air Toxics Policy). For new sources emitting HAPs with known negative health effects, an applicant must demonstrate that the combined impact of new HAP emission does not result in a maximum individual cancer risk greater than 1×10^{-5} (1 in 100,000).

3.1.6 Air Monitoring

Although the state of North Dakota does not have jurisdiction over air quality matters on the Reservation, it is helpful to note the monitoring efforts being made by the state and industry in the area. The NDDH operates a network of monitoring stations around the state that continuously measure pollution levels. Industry also operates monitoring stations as required by the state. The data from all these stations is subject to quality assurance, and when

approved, it is published on the Internet (available from the EPA and other sources). Monitoring stations near the project site include Watford City in McKenzie County, Dunn Center in Dunn County, and Beulah in Mercer County. These stations are located west, south, and southeast of the proposed well sites, respectively. Criteria pollutants measured include SO_2, PM_{10}, NO_2, and ozone. Lead and carbon monoxide are not monitored by any of the three stations. Table 1 summarizes federal air quality standards and available air quality data from the three-county study area. The highest value at any of the three monitoring locations is shown for each year.

Note that North Dakota has separate state standards for several pollutants that are different from the federal criteria standards. These are:

- SO_2 (parts per million [ppm]) – 0.023 annual arithmetic mean, 0.099 24-hour concentration, and 0.273 one-hour concentration
- Hydrogen sulfide (H_2S) (ppm) – 10 instantaneous, 0.20 one-hour, 0.10 24-hour, and 0.02 three-month arithmetic mean

All other state criteria pollutant standards are the same as the federal standards (shown in Table 1). North Dakota was one of 13 states that met standards for all federal criteria pollutants in 2008.

The CAA mandates prevention of significant deterioration in the designated attainment areas. Class I attainment areas have national significance and include national parks greater than 6,000 acres, national monuments, national seashores, and federal wilderness areas larger than 5,000 acres that were designated prior to 1977. Theodore Roosevelt National Park, a Class I area that covers about 110 square miles in three units within the Little Missouri National Grassland, lies between Medora and Watford City and is roughly 30 to 40 miles west of the proposed well sites. All other parts of the state, including the Reservation, are classified as Class II, affording them a lower level of protection from significant deterioration.

3.1.7 Response to the Threat of Climate Change

The EPA has proposed an endangerment finding that would allow regulation of GHGs under the CAA. The first step is a regulation that requires sources emitting 25,000 tons or more CO_2e to report their emissions. The EPA and the National Highway Traffic Safety Administration have increased corporate fuel economy standards to promote national energy security and reduce GHGs. Standards will equal 35 miles per gallon by 2020, with an estimated savings to drivers of $100 billion annually. Many U.S. states and foreign nations have adopted goals and actions to reduce GHGs to levels scientists forecast will allow the earth's climate to stabilize at 1 to 2 degrees Celsius above the current level. Additional regulation is currently being developed by Congress to roll back emissions to levels recommended by atmospheric scientists.

3.1.8 Typical Project Emissions

Oil field emissions encompass three primary areas: combustion, fugitive, and vented.

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and HAPs. Sources include engine exhaust, dehydrators, and flaring.
- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources include equipment leaks, evaporation ponds and pits, condensate tanks, storage tanks, and wind-blown dust (from truck and construction activity).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents.

Pad and road construction, drilling activities, and tanker traffic would generate emissions of criteria pollutants and HAPs. Primary emissions sources during drilling are diesel exhaust, wind-blown dust from disturbed areas and travel on dirt roads, evaporation from pits and sumps, and gas venting. Diesel emissions are being progressively controlled by the EPA in a nationwide program. This program takes a two-pronged approach. First, fuels are improving to the ultra-low sulfur standard, and second, manufacturers must produce progressively lower engine emissions.

3.1.9 Regulatory Emission Controls

Under the CAA, federal land management agencies have an affirmative responsibility to help protect air quality. The tribes, federal land managers, and the State of North Dakota can make emission controls part of a lease agreement. The proposed project is similar to other projects installed nearby with state approval. State policy for permitting new oil and gas wells is as follows: Any oil or gas well production facility that emits or has the potential to emit 250 tons per year or more of any air contaminant regulated under North Dakota code must comply with state permitting requirements. The discussion outlines requirements for control of emissions from treaters, separators, flares, tanks, and other on-site equipment.

The North Dakota Air Pollution Control Rules require that the owner/operator submit an oil/gas facility registration form. This form must include an analysis of any gas produced from the well. The following sources must register oil and gas wells with the NDDH:

1. Any oil and gas well that is/was completed or recompleted on or after July 1, 1987. The registration form must be submitted within 90 days of the completion or recompletion of the well.
2. The owner or operator of any oil or gas well shall inform the NDDH of any change to the information contained on the registration form for a particular well. The owner shall submit a new gas analysis if the composition or the volume of the gas produced from the well has changed from the previous analysis, and caused an increase of 10 tons per year or more in sulfur compounds.
3. North Dakota rules require that all new sources of H_2S and VOCs be flared or treated in an equally effective manner. Flares must have an automatic igniter or pilot light. The stack height of flares will be sufficient to allow dispersion of the flared gas. The gas produced from the Bakken Formation is typically low in H_2S, so odors from fugitive gas leaks are not expected to be a problem.

4. Chapter 33-15.03.03 of the North Dakota Air Pollution Control Rules specifies that fugitive dust emissions greater than 40% opacity cannot leave the project site for more than one 6-minute period per hour. This applies to all construction and unpaved road emission sources.

3.1.10 Air Quality Best Management Practices

Under the CAA, federal land management agencies have an affirmative responsibility to protect air quality. Tribes, federal land managers, and private entities can make emission controls part of a lease agreement. BMPs can be adopted for various portions of an oil/gas well's lifecycle. BMPs fall into the following six general categories.

- **Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions**
  - Use directional drilling to drill multiple wells from a single well pad;
  - use centralized water storage and delivery, well fracturing, gathering systems;
  - use telemetry to remotely monitor and control production;
  - use water or dust suppressants to control fugitive dust on roads;
  - control road speeds; and
  - use van or carpooling.
- **Drilling BMPs to reduce rig emissions**
  - Use cleaner diesel (Tier 2, 3, and 4) engines;
  - use natural gas-powered engines; and
  - use "green" completions to recapture product that otherwise would have been vented or flared.
- **Unplanned or emergency releases**
  - Use high-temperature flaring if gas is not recoverable.
- **Vapor recovery**
  - Use enclosed tanks instead of open pits to reduce fugitive VOC emissions; and
  - use vapor recovery units on storage tanks.
- **Inspection and maintenance**
  - Use and maintain proper hatches, seals, and valves;
  - optimize glycol circulation and install a flash tank separator;
  - use selective catalytic reduction; and
  - replace high-bleed with low-bleed devices on pneumatic pumps.

- **Monitoring and repair**
    - Use directed inspection and maintenance methods to identify and cost-effectively fix fugitive gas leaks; and
    - Install an air quality monitoring station.

3.2 WATER RESOURCES

3.2.1 Surface Water

As shown in Figure 15, the three Petro-Hunt wells would be located approximately 2.5 miles north of the Little Missouri River, which is classified by the U.S. Geological Survey (USGS) as perennial. Given the topography of the individual sites over the project area, runoff would occur largely as overland sheet-flow.

The proposed Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad is located in the Dry Creek subwatershed (Hydrologic Unit Code [HUC] 101102050506) of the Burnt Creek watershed (HUC 1011020505). Run-off from the dual well pad would likely travel as overland sheet flow southwest until it enters into a potentially intermittent drainage. Flow would then travel south-southwest until its confluence with the Little Missouri River south of the project area.

The proposed Fort Berthold #148-94-29B-32-1H single well pad is located in the Upper Moccasin Creek subwatershed (HUC 101102050604) of the Waterchief Bay Watershed (HUC 1011010130). Runoff from the well pad would flow to the east-southeast into an unnamed, potentially ephemeral drainage. Flow would then travel east-southeast until it entered into Moccasin Creek. Once in Moccasin Creek, run-off would travel east-southeast, approximately 11.5 river miles, until reaching Moccasin Creek Bay of Lake Sakakawea.

The proposed project would be engineered and constructed to minimize the suspended solid (i.e., turbidity) concentration of surface runoff, avoid disruption of drainages, and avoid direct impacts to surface water. No surface water would be used for well drilling operations. Any chemicals or potentially hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan. Provisions established under this plan would minimize potential impacts to any surface waters associated with an accidental spill.

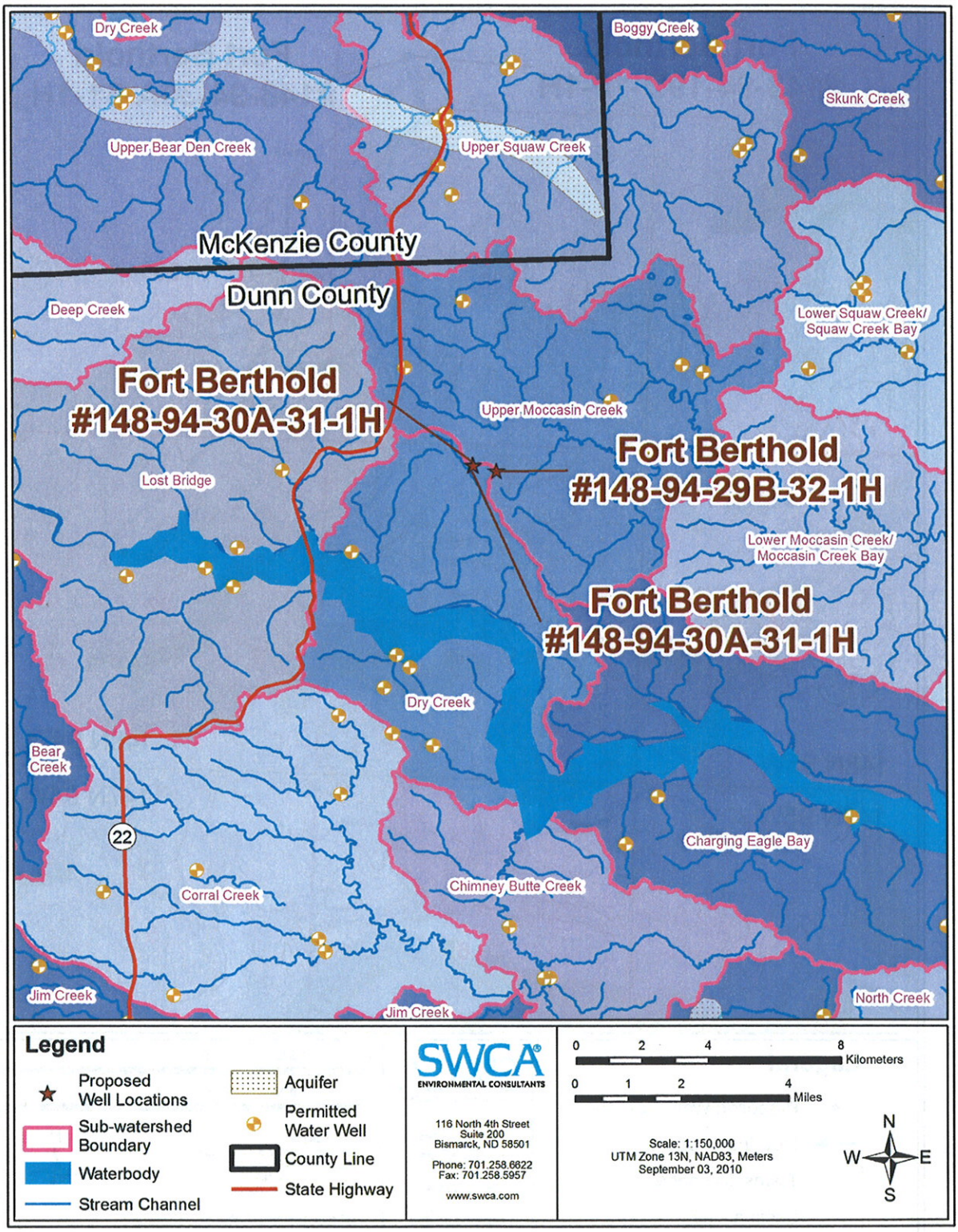

Figure 15. Watersheds, surficial aquifers, and permitted water wells.

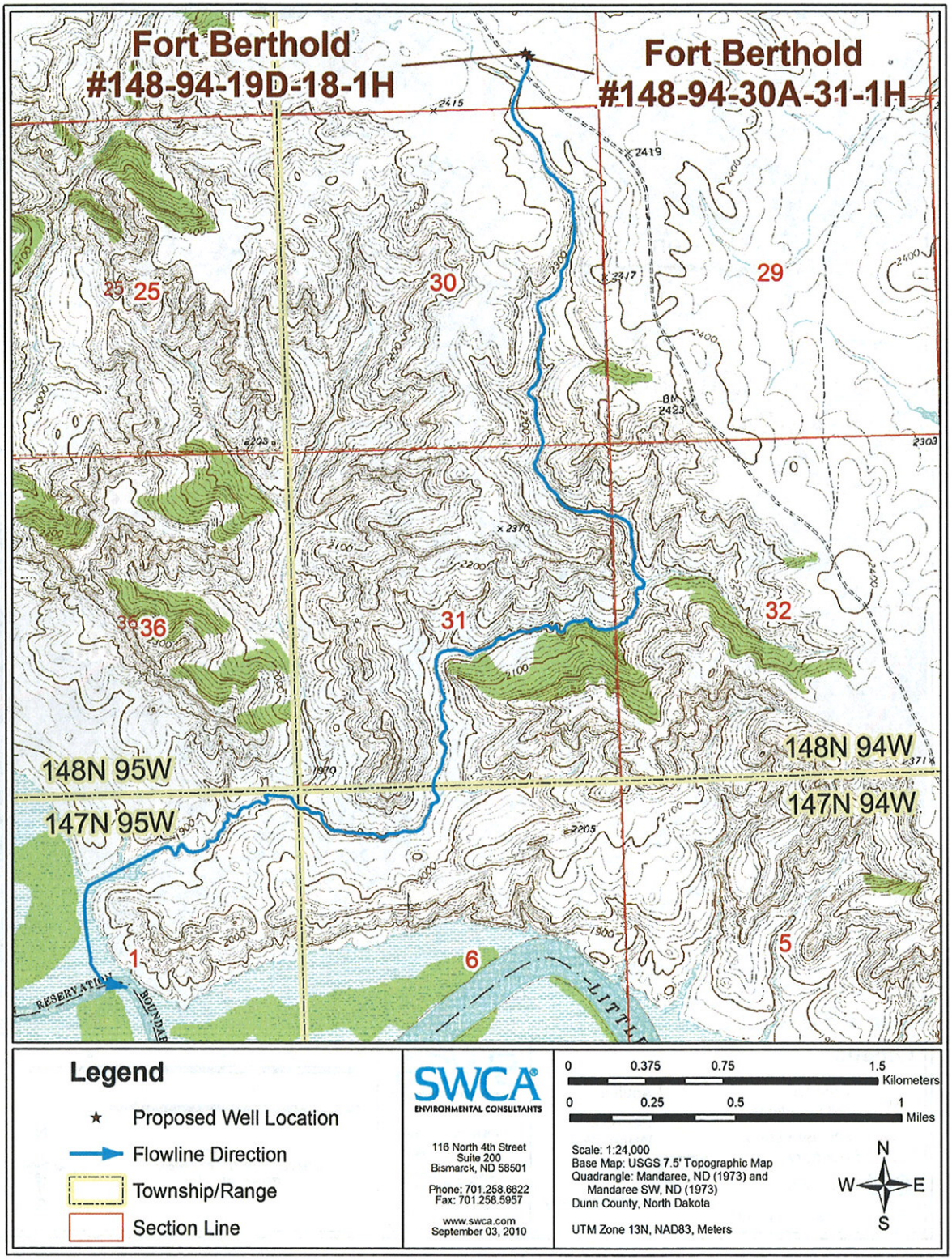

Figure 16. Estimated flow path from the Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad.

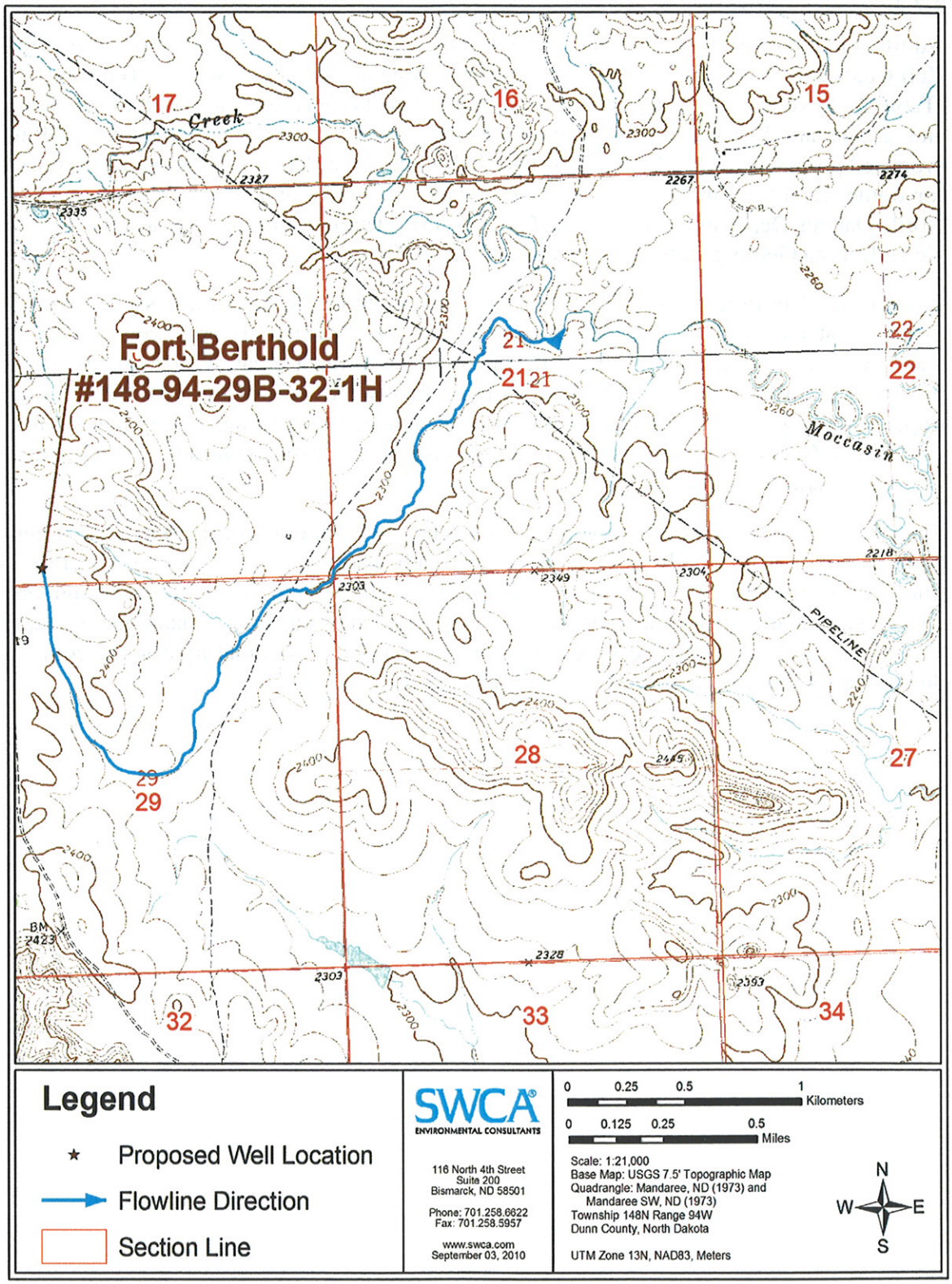

Figure 17. Estimated flow path from the Fort Berthold #148-94-29B-32-1H single well pad.

3.2.2 Groundwater

Aquifers in the project area include, from deepest to shallowest, the Cretaceous Fox Hills and Hell Creek formations and the Tertiary Ludlow, Tongue River, and Sentinel Butte formations (Table 2). Several shallow aquifers related to post-glacial outwash composed of till, silt, sand, and gravel are located in Dunn and McKenzie counties. However, none are within the proposed project area (see Figure 15). The shallow Sentinel Butte Formation, commonly used for domestic supply in the area, outcrops in Dunn County and meets the standards of the North Dakota Department of Health (Croft 1985). Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III, 1976.

Review of electronic records of the North Dakota State Water Commission revealed 23 existing water wells within an approximate 5-mile radius of the proposed wells (Table 3). No water wells are present within a 1-mile radius of the project areas. Water quality would be protected by drilling with freshwater to a point below the base of the Fox Hills Formation, implementing proper hazardous materials management, and using appropriate casing and cementing. Drilling would proceed in compliance with Onshore Oil and Gas Order No. 2, Drilling Operations (43 CFR 3160).

Since none of the proposed project area lies within the boundaries of the post-glacial outwash aquifers, low porosity bedrock near the project well would act as confining layers to prevent impacts to groundwater resources. Additionally, well completion methods would prevent cross contamination between aquifers or the introduction of hazardous materials into aquifers. The majority of the identified groundwater wells may have minimal hydrologic connections due to their respective distance from the project well.

Table 2. Common Aquifers in the Proposed Project Area and Surrounding Region.

Period	Formation		Depth Range (feet)	Thickness (feet)	Lithology	Water-Yielding Characteristics
Quaternary	Alluvium		0–40	40	Silt, sand, and gravel	Maximum yield of 50 gal/min to individual wells from sand and gravel deposits.
Tertiary	Fort Union Group	Sentinel Butte	0–670	0–670	Silty clay, sand and lignite	5 to 100 gal/min in sandstone. 1 to 200 gal/min in lignite.
		Tongue River	140–750	350–490	Silty clay, sand and lignite	Generally less than 100 gal/min in sandstone.
		Cannonball/ Ludlow	500–1,150	550–660	Fine- to medium-grained sandstone, siltstone, and lignite	Generally less than 50 gal/min in sandstone.
Cretaceous	Hell Creek		1,000–1,750	200–300	Claystone, sandstone, and mudstone	5 to 100 gal/min in sandstone.
	Fox Hills		1,100–2,000	200–300	Fine- to medium-grained sandstone and some shale	Generally less than 200 gal/min in sandstone. Some up to 400 gal/min.

Source: Croft (1985) and Klausing (1979).
gal/min = gallons per minute

Table 3. Existing Water Wells near the Project Area.

Well Number	Owner	Date Drilled	Section	Township (N)/ Range (W)	Type/Use	Depth (feet)	Aquifer	Miles to Proposed Well
148-095-22CCA	Emerson Chase	Unknown	22	148/095	Unknown	1,430	Fox Hills	3.58
148-095-12DCC2	USGS	06/23/1992	12	148/095	Observation Well	51	Sentinel Butte-Tongue River	2.26
148-094-15CAD	J Woundedface Spring	Unknown	15	148/094	Surface Water Sample Site	0	Surface Water	2.89
148-094-06DBD	Unknown	Unknown	6	148/094	Unknown	0	Sentinel Butte-Tongue River	3.13
148-094-23CBD	E. Rateman Spring	Unknown	23	148/094	Surface Water Sample Site	0	Surface Water	3.40
148-095-33BDB	Unknown	Unknown	33	148/095	Unknown	436	Tongue River	4.67
148-094-14AAB	USGS	06/23/1992	14	148/094	Observation Well	300	Tongue River	4.39
148-095-35BDD	Tony Fettig	Unknown	35	148/095	Unknown	400	Tongue River	2.80
148-094-13BBD	Bill Hall	Unknown	13	148/094	Unknown	30	Sentinel Butte-Tongue River	4.70
147-095-12BCD	Thorris Sandvick	Unknown	12	147/095	Unknown	400	Tongue River	3.87
147-095-14AAA	NDSPS	01/01/68	14	147/095	Municipal Well	1,430	Fox Hills	4.54
147-095-12CAD	Thorris Sandvick	01/01/69	12	147/095	Unknown	1,410	Fox Hills	4.01
148-095-22CCA	Emerson Chase	Unknown	22	148/095	Unknown	1,430	Fox Hills	4.01
148-095-12DCC2	USGS	06/23/1992	12	148/095	Observation Well	51	Sentinel Butte-Tongue River	2.61
147-095-12BCD	Thorris Sandvick	Unknown	12	147/095	Unknown	400	Tongue River	3.97

Well Number	Owner	Date Drilled	Section	Township (N)/ Range (W)	Type/Use	Depth (feet)	Aquifer	Miles to Proposed Well
148-094-15CAD	J Woundedface Spring	Unknown	15	148/094	Surface Water Sample Site	0	Surface Water	2.55
148-094-06DBD	Unknown	Unknown	6	148/094	Unknown	0	Sentinel Butte-Tongue River	3.28
148-094-23CBD	E. Rateman Spring	Unknown	23	148/094	Surface Water Sample Site	0	Surface Water	2.97
148-094-14AAB	USGS	06/23/1992	14	148/094	Observation Well	300	Tongue River	4.04
147-095-14AAA	NDSPS	01/01/1968	14	147/095	Municipal Well	1,430	Fox Hills	4.63
147-095-12CAD	Thorris Sandvick	01/01/1969	12	147/095	Unknown	1410	Fox Hills	4.08
148-095-35BDD	Tony Fettig	Unknown	35	148/095	Unknown	400	Tongue River	3.11
148-094-13BBD	Bill Hall	Unknown	13	148/094	Unknown	30	Sentinel Butte-Tongue River	4.33

Source: North Dakota State Water Commission (2009).

3.3 WETLANDS, HABITAT, AND WILDLIFE

3.3.1 Wetlands

During the field survey one small palustrine emergent wetland (PEM), identified by SWCA ecologists, was observed within the disturbance footprint of the Fort Berthold #148-94-19D-18-1H/Fort Berthold #148-94-29B-32-1H dual well pad. As a result, the dual well pad was moved north so that no temporary or permanent impact would occur to the aforementioned PEM wetland. No other wetlands were observed along any access road ROW or at the well sites during surveys conducted in May and June 2010. No riparian or wetland habitats are anticipated to be directly or indirectly impacted by the proposed access roads or well pads.

According to the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory database (2009), one PEM wetland is located approximately 0.57 mile from the proposed Fort Berthold #148-94-29B-32-1H well pad and 0.35 mile from the proposed Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad (Table 4). This PEM wetland would not be impacted as a result of construction, drilling, or production activities associated with the proposed well pads and associated access roads.

Table 4. Distance and Bearings from Well Pad Locations to PEM Wetland.

Well Pad	Distance (mile)	Bearings (degrees)
Fort Berthold #148-94-19D-18-1H	0.35	15.97
Fort Berthold #148-94-30A-31-1H	0.35	15.97
Fort Berthold #148-94-29B-32-1H	0.57	323.41

3.3.2 Wildlife

Several wildlife species that may exist in Dunn County are listed as threatened or endangered under the Endangered Species Act (ESA). Listed species in Dunn County include the black-footed ferret, gray wolf, interior least tern, pallid sturgeon, piping plover, and whooping crane (USFWS 2010). Although delisted in 2007, the bald eagle remains a species of special concern to the BIA and the Department of the Interior. Tribes and states may recognize additional species of concern; such lists are taken under advisement by federal agencies but are not legally binding in the manner of the ESA. Listed species are described below.

ENDANGERED SPECIES ACT

Black-footed Ferret (*Mustela nigripes*)
Affects Determination: No Effect

Black-footed ferrets are nocturnal, solitary carnivores of the weasel family that have been largely extirpated from the wild primarily due to range-wide decimation of the prairie dog (*Cynomys* sp.) ecosystem (Kotliar et al. 1999). They have been listed by the USFWS as endangered since 1967, and have been the object of extensive re-introduction programs (USFWS 2010a). Ferrets inhabit extensive prairie dog complexes of the Great Plains, typically composed of several smaller colonies in proximity to one another that provide a sustainable prey base. The *Black-footed Ferret Survey Guidelines for Compliance with the*

Endangered Species Act (USFWS 1989) states that ferrets require black-tailed prairie dog (*Cynomys ludovicianus*) towns or complexes greater than 80 acres in size, and towns of this dimension may be important for ferret recovery efforts (USFWS 1988a). Prairie dog towns of this size are not found in the project area. In addition, this species has not been observed in the wild for more than 20 years. The proposed project will have **no effect** on this species.

Gray Wolf (*Canis lupus*)
Affects Determination: May Affect, is Not Likely to Adversely Affect

The gray wolf, listed as endangered in the United States in 1978, was believed extirpated from North Dakota in the 1920s and 1930s with only sporadic reports from the 1930s to present (Licht and Huffman 1996). The presence of wolves in most of North Dakota consists of occasional dispersing animals from Minnesota and Manitoba (Licht and Fritts 1994; Licht and Huffman 1996). Most documented gray wolf sightings that have occurred within North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). The Turtle Mountains region in north-central North Dakota provides marginal habitat that may be able to support a very small population of wolves. The closest known pack of wolves is the Minnesota population located approximately 28 kilometers (km) from the northeast corner of North Dakota.

The gray wolf uses a variety of habitats that support a large prey base, including montane and low-elevation forests, grasslands, and desert scrub (USFWS 2010b). Due to a lack of forested habitat and distance from Minnesota and Manitoba populations, as well as the troubled relationship between humans and wolves and their vulnerability to being shot in open habitats (Licht and Huffman 1996), the re-establishment of gray wolf populations in North Dakota is unlikely. Additionally, habitat fragmentation, in particular road construction as a result of oil and gas development, may further act as a barrier against wolf recolonization in western North Dakota. Therefore, the proposed project would have **no effect** on the gray wolf.

Whooping Crane (*Grus americana*)
Affect Determination: May Affect, is Not Likely to Adversely Affect

The whooping crane was listed as endangered in 1970 in the United States by the USFWS, and in 1978 in Canada. Historically, population declines were caused by shooting and destruction of nesting habitat in the prairies from agricultural development. Current threats to the species includes habitat destruction, especially suitable wetland habitats that support breeding and nesting, as well as feeding and roosting during their fall and spring migration (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007).

The July 2010 total wild population was estimated at 383 (USFWS 2010c). There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, where approximately 83% of the wild nesting sites occur (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007; USFWS 2010c). Dunn and McKenzie counties, including the project area, are within the primary migratory flyway of whooping cranes.

Whooping cranes probe the soil subsurface with their bills for foods on the soil or vegetation substrate (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007). Whooping cranes are omnivores and foods typically include agricultural grains, as well as insects, frogs, rodents, small birds, minnows, berries, and plant tubers. The largest amount of time during migration is spent feeding in harvested grain fields (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007). Studies indicate that whooping cranes use a variety of habitats during migration, in addition to cultivated croplands, and generally roost in small palustrine (marshy) wetlands within 1 km of suitable feeding areas (Howe 1987, 1989). Whooping cranes have been recorded in riverine habitats during their migration, with eight sightings along the Missouri River in North Dakota (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007:18). In these cases, they roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

A limited density of known suitable foraging habitat (i.e., cultivated cropland) is present within an approximate 1-mile radius of the project areas. However, construction activities would likely occur outside of the whooping crane migration period making their presence within or around the project area during construction unlikely. As a form of active mitigation, all work would cease if a whooping crane is observed within a 1-mile radius of the project area. Therefore, due to the commencement of construction activities outside of the whooping crane migration period and the cessation of work if a whooping crane is observed within a 1-mile radius, this project may affect, but is not likely to adversely affect the whooping crane.

Piping Plover (*Charadrius melodus*)
Affect Determination: May Affect, is Not Likely to Adversely Affect

The piping plover is a small shorebird which breeds only in three geographic regions of North America: the Atlantic Coast, the northern Great Plains, and the Great Lakes. Piping plover populations were federally listed as threatened and endangered in 1985, with the northern Great Plains and Atlantic Coast populations listed as threatened, and the Great Lakes population listed as endangered (USFWS 1985a).

Plovers in the Great Plains make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars, and dredged material islands of major river systems (USFWS 2002, 2010d). The shorelines of lakes of the Missouri River constitute significant nesting areas for the bird. Piping plovers nest on the ground, making shallow scrapes in the sand, which they line with small pebbles or rocks (USFWS 1988b). Anthropogenic alterations of the landscape along rivers and lakes where piping plover nest have increased the number and type of predators, subsequently decreasing nest success and chick survival (USFWS 2002, 2010d). The birds fly south by mid to late August to areas along the Texas coast and Mexico (USFWS 2002). The northern Great Plains population has continued to decline despite federal listing, with population estimates of 1,500 breeding pairs in 1985 reduced to fewer than 1,100 in 1990. Low survival of adult birds has been identified as a factor (Root et al. 1992). Current conservation strategies include identification and preservation of known nesting sites, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 1988b, 2010d).

Suitable shoreline habitats for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea/Little Missouri River is a minimum of 4.5 river miles away from the proposed well pads and access roads. It is unlikely that migrating plovers would visit the project area during their migration. Therefore, the proposed project may affect, but is not likely to adversely affect piping plovers.

Designated Critical Habitat of Piping Plover
Affect Determination: May Affect, is Not Likely to Adversely Affect

The USFWS has designated critical habitat for the Great Lakes and northern Great Plains populations of piping plover (USFWS 2002). Designated critical habitat for the piping plover includes 183,422 acres and 1,207.5 river miles of habitat, including areas near the proposed project, along the shoreline of Lake Sakakawea in McKenzie County, North Dakota (USFWS 2002).

Since the project will not modify, alter, disturb, or affect the shoreline of Lake Sakakawea or any of its tributary streams in any way, no effect to designated critical habitat of the piping plover would occur.

Interior Least Tern (*Sterna antillarum*)
Affect Determination: May Affect, is Not Likely to Adversely Affect

The interior population of the least tern is listed as endangered by the USFWS (1985b). This bird is the smallest member of the gull and tern family, measuring approximately 9 inches in length. Terns remain near flowing water, where they feed by hovering over and diving into standing or flowing water to catch small fish (USFWS 2010e).

The interior population of least terns breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, where they nest in small colonies. From late April to August, terns nest in a shallow hole scraped in an open sandy area, gravel patch, or exposed flat and bare sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. The adults continue to care for chicks after they hatch. Least terns in North Dakota will often be found sharing sandbars with the piping plover, a threatened species (USFWS 2010e).

Census data indicate over 8,000 least terns in the interior population. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone rivers upstream of Lake Sakakawea (USFWS 1990a, 2010e). Approximately 100 pairs breed in North Dakota (USFWS 2010e). Details of their migration are not known, but their winter range is reported to include the Gulf of Mexico and Caribbean Islands (USFWS 1990a, 2010e).

Loss of suitable breeding and nesting habitat for terns has resulted from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. River and reservoir changes have led to reduced sandbar formation and other shoreline habitats for breeding, resulting in population declines. In addition, other human shoreline disturbances affect the species (USFWS 1990a). Critical habitat has not been designated for the species (USFWS 2010e).

Current conservation strategies include identification and avoidance of known nesting areas, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 2010e).

Suitable shoreline habitats for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea is a minimum of 4.5 river miles away from the proposed well pads and access roads. It is unlikely that terns would visit the upland habitats present in the project area. Therefore, the proposed project may affect, but is not likely to adversely affect endangered least terns.

Pallid Sturgeon (*Scaphirhynchus albus*)
Affect Determination: May Affect, is Not Likely to Adversely Affect

The pallid sturgeon was listed as Endangered in 1990 in the United States by the USFWS (1990b). The primary factor leading to the decline of this species is the alteration of habitat through river channelization, creation of impoundments, and alteration of flow regimes (USFWS 1990b). These alterations within the Missouri River have blocked movements to spawning, feeding, and rearing areas, destroyed spawning habitat, altered flow conditions which can delay spawning cues, and reduced food sources by lowering productivity (USFWS 2007a). The fundamental elements of pallid sturgeon habitat are defined as the bottom of swift waters of large, turbid, free-flowing rivers with braided channels, dynamic flow patterns, flooding of terrestrial habitats, and extensive microhabitat diversity (USFWS 1990b).

The pallid sturgeon population which is found near the project area occurs from the Missouri River below Fort Peck Dam to the headwaters of Lake Sakakawea and the lower Yellowstone River up the confluence of the Tongue River, Montana (USFWS 2007a). This population consists of approximately 136 wild adult pallid sturgeon (USFWS 2007a). Hatchery reared sturgeon have also been stocked since 1998. The pallid sturgeon has been found to use the 25 km of riverine habitat that would be inundated by Lake Sakakawea at full pool (Bramblett 1996 per USFWS 2007a). Larval pallid sturgeons have also been found to drift into Lake Sakakawea. While the majority of pallid sturgeons are found in the headwaters of Lake Sakakawea, North Dakota Game and Fish have caught and released pallid sturgeon in nets set in 80 to 90 feet of water between the New Town and Van Hook area. Based on this information, pallid sturgeon could be found throughout Lake Sakakawea (personal communication, email from Steve Krentz, Pallid Sturgeon Project Lead, U.S. Fish and Wildlife Service, to Mike Cook, Aquatic Ecologist, SWCA Environmental Consultants, September 3, 2010).

Suitable habitat for pallid sturgeon does not occur in the project area, and Lake Sakakawea/Little Missouri River is a minimum of 4.5 river miles away from the proposed well pads and access roads. However, Moccasin Creek which drains the Fort Berthold #148-94-29B-32-1H project area is a perennial tributary to the Missouri River and Lake Sakakawea. Potential pollution and sedimentation occurring within the project area are concerns for downstream populations of endangered pallid sturgeon. Activities associated with the construction, production, or reclamation of the proposed project area are not

anticipated to adversely affect water quality and subsequently the pallid sturgeon. Therefore, the proposed project may effect, but is not likely to adversely affect pallid sturgeon.

Dakota Skipper (*Hesperia dacotae*)
Affect Determination: May Affect, is Not Likely to Adversely Affect

The Dakota skipper is a small butterfly with a 1-inch wingspan and is found primarily in undisturbed native tall grass and upland dry mixed grass prairie areas with a high diversity of wildflowers and grasses (Committee on the Status of Endangered Wildlife in Canada 2003). The Dakota skipper appears to require a range of precipitation-evaporation ratios between 60 and 105 and a soil pH between 7.2 and 7.9 (McCabe 1981). Larvae feed on grasses, favoring little bluestem. Adults commonly feed on nectar of flowering native forbs such as harebell (*Campanula rotundifolia*), wood lily (*Lilium philadelphicum*), and purple coneflower (*Echinacea angustifolia*). The species is threatened by conversion of native prairie to cultivated agriculture or shrublands, over-grazing, invasive species, gravel mining, and inbreeding (USFWS 2005). Dakota skippers are not known to occur within the project area; however, suitable habitat does occur. The proposed project may affect, but is not likely to adversely affect this species. The use of BMPs and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

MIGRATORY BIRD TREATY ACT / THE BALD AND GOLDEN EAGLE PROTECTION ACT

Bald Eagle (*Haliaeetus leucocephalus*)
Status: Delisted in 2007; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

Suitable nesting or foraging habitat for bald eagles includes old growth trees relatively close (usually less than 1.24 miles [Hagen et al. 2005]) to perennial waterbodies. The project area does not contain old growth trees and the closest well pad (Dakota 3-Fox #14-8H) is 2.64 miles from Lake Sakakawea and 9.39 miles from the Little Missouri River. No eagles were observed during the field surveys. Therefore, no adverse effects are anticipated. However, the possibility of transient, flying bald eagle individuals traversing the project area does exist.

Golden Eagle (*Aquila chrysaetos*)
Status: Unlisted; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

No eagles were observed during the field surveys, however, golden eagles may occur within or near the project area. The golden eagle prefers habitat characterized by open prairie, plains, and forested areas. Usually, golden eagles can be found in proximity to badland cliffs which provide suitable nesting habitat. However, no primary or secondary indication of golden eagle presence, including nests, was observed within or near the project area during the field survey. Therefore, the project is unlikely to cause any adverse effects to golden eagles.

No adverse impacts to listed species are anticipated because of the low likelihood of their occurrence in the proposed project area, confirmed by on-site assessments conducted by biologists from SWCA Environmental Consultants (SWCA). The primary impacts to wildlife species would be short-term and would come as a result of the construction of the well pad areas including construction of new access roads, increased vehicular traffic density, and drilling activities. Ground clearing may impact habitat for unlisted species, including small birds, small mammals, and other wildlife species. Proposed projects may affect raptor and migratory bird species through direct mortality, habitat degradation, and/or displacement of individual birds. These impacts are regulated in part through the Migratory Bird Treaty Act of 1918 (916 USC 703–711). Fragmentation of native prairie habitat can detrimentally affect grouse species and other grassland bird species. Potential impacts during any long-term commercial production could include the effects of occasional traffic and continuing erosion or noxious weed infestations along the access road. Such long-term effects would be negligible with the implementation of BMPs.

Several precautions, committed to by Petro-Hunt, to limit or reduce the possible impact to all wildlife species include:

- locating the well pads over an area with existing disturbance;
- netting the reserve pits between drilling and reclamation;
- removing any oil found in the pits;
- installing covers under drip buckets and spigots; and
- conducting interim reclamation of portions of the disturbed site not needed for production.

Other than a visual sighting of a western meadowlark (*Sturnella neglecta*), and deer (*Odocoileus sp.*) scat, by SWCA ecologists, no other wildlife species were observed during field visits to the proposed project area.

Reclamation would begin without delay if the wells are determined to be unproductive, or upon completion of commercial production. Any wildlife species inhabiting the project area are likely to adapt to changing conditions, and continue to persist without adverse impact.

3.4 SOILS

The area of potential effect for the proposed project includes the well pads, access roads, and surface areas that could be affected by runoff from the well pads and access roads. Essentially, this includes the area that is downslope from the well locations until it reaches Lake Sakakawea. The Greenhorn Formation, which consists of thin limestone and dark gray to black organic-rich shale, is found from the surface to a depth of approximately 4,000 feet. The Greenhorn is subdivided into lower and upper intervals of limestone and calcareous shale with a middle interval of shale. Near-surface sediment is of Recent, Pleistocene, or Tertiary age, and includes Sauk, Tippecanoe, Kaskaskia, Absaroka, Zuni, and Tejas Sequences.

3.4.1 Natural Resources Conservation Service Soil Data

The Natural Resources Conservation Service (NRCS 2009) soil series present on the well pad and access road areas, and the respective acreages, are summarized in Table 5. The acreage shown in Table 5 is based on the spatial extent of soil series combinations derived from NRCS data (Figure 18); therefore, the acreage is approximate and used as a best estimate of soil series distribution at the proposed project area.

Table 5. Percentage of the Well Pad and Access Road Composed of Specific Soil Types.

Feature	Soil Series	Acres	% of Location
Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H (Dual Well Pad)			
Access Road	Ruso sandy loam, 0–6% slopes	0.448143	100
Well Pad	Ruso sandy loam, 0–6% slopes	1.900741	44.5
	Arnegard loam, 2–6% slopes	1.524333	35.7
	Cohagen-Verbar fine sandy loams, 9–25% slopes	0.8845396	19.8
Fort Berthold #148-94-29B-32-1H			
Access Road	Verbar-Parshall fine sandy loams, 0–6% slopes	0.924364	47.2
	Rhoads silt loam, 0–6% slopes	0.66903	34.2
	Verbar-Parshall fine sandy loams, 6–9% slopes	0.363136	18.6
Well Pad	Verbar-Parshall fine sandy loams, 0–6% slopes	3.426468	93.3
	Cohagen-Verbar fine sandy loams, 9–25% slopes	0.247962	6.7
Shared Access Road			
Shared Access Road	Ruso sandy loam, 0–6% slopes	4.351877	37.2
	Bowdle loam, 2–6% slopes	3.532707	30.2
	Rhoads silt loam, 0–6% slopes	1.485146	12.6
	Rhoads silt loam, 0–6% slopes	1.062451	9.1
	Verbar fine sandy loams, 9–15% slopes	0.892396	7.6
	Verbar-Parshall fine sandy loams, 6–9% slopes	0.384889	3.3

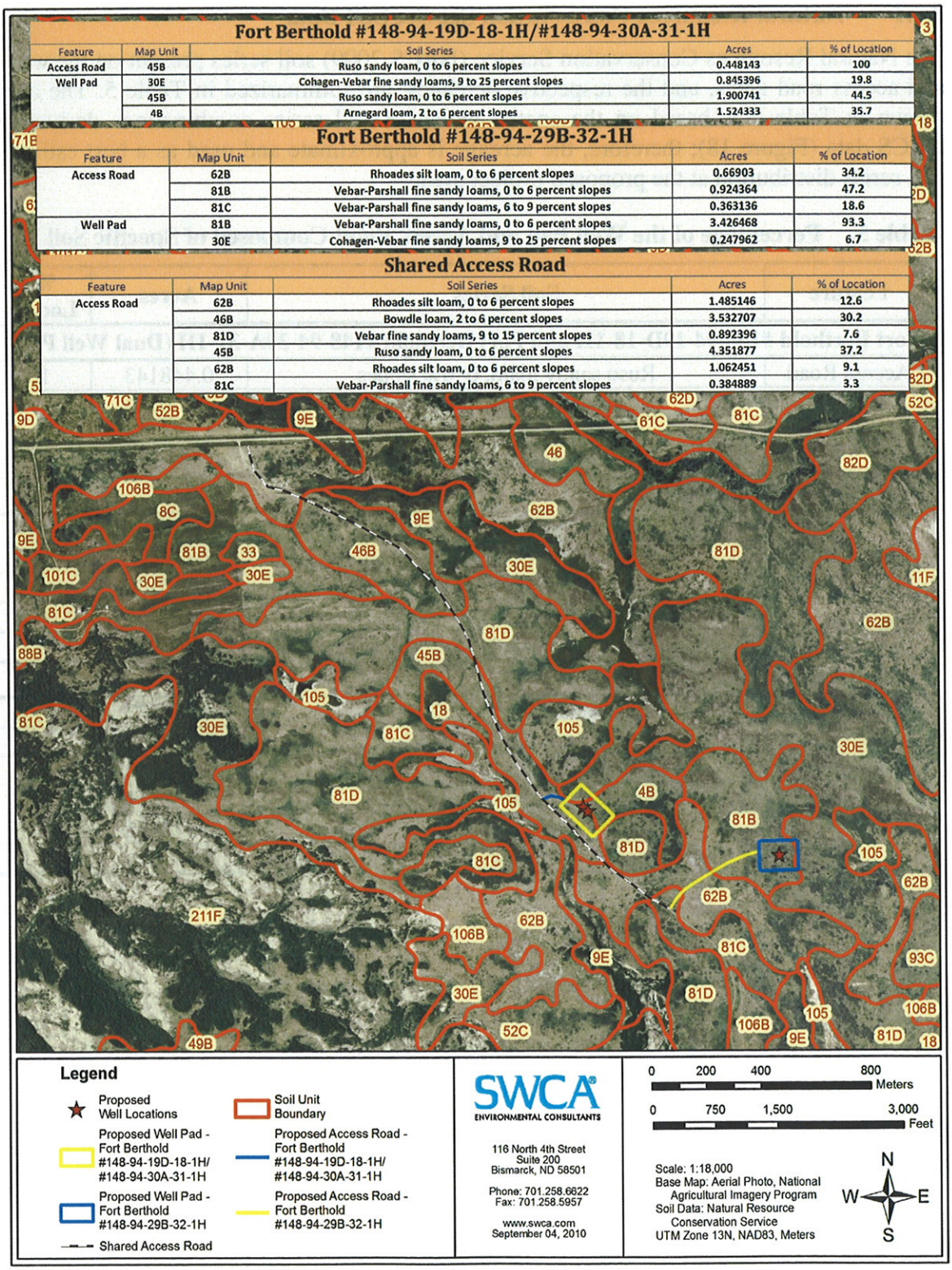

Figure 18. Approximate spatial extent of soil types in and around the proposed wells.

The following soil series descriptions represent individual soil series reported to exist within the proposed project area (NRCS 2009). Each individual soil series does not exist individually in the project area but rather in combination with other soil types.

Arnegard: The Arnegard series consists of very deep, well or moderately well drained soils that formed in calcareous loamy alluvium on upland swales, terraces, fans, and foot slopes. Permeability is moderate. Slopes range from 0 to 25 percent. Mean annual air temperature is 42°F, and mean annual precipitation is 14 inches. Most areas are cropped to spring wheat, oats, barley, and hay. Native vegetation is mid, tall, and short grasses such as western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nasella viridula*), big bluestem (*Andropogon geradii*), and blue grama (*Bouteloua gracilis*) (NRCS 2009).

Bowdle: The Bowdle series consists of well drained soils formed in loamy alluvium underlain by sand and gravel. The soils are moderately deep over sand and gravel and are on outwash plains and stream terraces. Permeability is moderate in the solum and rapid or very rapid in the underlying material. Slopes range from 0 to 15 percent. Mean annual precipitation is about 18 inches, and mean annual air temperature is about 44°F. Most areas are primarily cropped to small grain, alfalfa, and some flax and corn. Native vegetation is primarily western wheatgrass, blue grama, green needlegrass, needleandthread (*Hesperostipa comata*), forbs, and sedges (NRCS, 2009).

Cohagen: The Cohagen series consists of shallow, well to excessively drained soils found on sandstone bedrock uplands with slopes ranging from approximately 3 to 70 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for rangeland foraging with occasional cultivation. Native vegetation species common to this soil type include little bluestem (*Schizachyrium scoparium*), needleandthread, and prairie sandreed (*Calamovilfa longifolia*) (NRCS 2009).

Parshall: The Parshall series consists of very deep, moderately to rapidly permeable, well drained soils found on uplands with slopes ranging from approximately 0 to 25 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for cultivation of small grains and other crops. Native vegetation species common to this soil type include needleandthread and other various medium and short prairie grasses (NRCS 2009).

Rhoads: The Rhoades series consists of deep and very deep, well to moderately well drained, very slowly permeable soils found on swales and uplands with slopes ranging from approximately 0 to 25 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass and blue grama (NRCS 2009).

Ruso: Ruso soils consist of well drained, slow runoff, and moderately rapid permeable soils. Ruso soils are on level to moderately sloping outwash plains and stream terraces that dissect

till plains. Slopes are plane or slightly concave and gradients typically are less than 3 percent but range to 9 percent. The soils formed in loamy alluvium over stratified sand and gravel. The climate is semiarid. Mean annual air temperature is from 34 to 45 degrees F, and mean annual precipitation is 12 to 17 inches, most of which falls in the spring and summer. Native vegetation consists of needleandthread (*Hesperostipa comata*), prairie sandreed (*Calamovilfa longifolia*), western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), little bluestem (*Schizachyrium scoparium*), sedges, forbs and snowberry. (NRCS 2009).

Verbar: The Vebar series consists of moderately deep, moderately to rapidly permeable, well drained soils found on uplands with slopes ranging from approximately 0 to 65 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for cultivation of corn and small grains. Native vegetation species common to this soil type include needleandthread and prairie sandreed (*Calamovilfa longifolia*) (NRCS 2009).

3.4.2 Field-derived Soil Data

Soil data derived from on-site excavated soil pits, including the matrix value, hue, chroma, and color name, are summarized in Table 6. Additionally, redoximorphic features (i.e., reduced/oxidized iron or manganese) deposits and soil texture were looked for at each location and noted where found. A Munsell soil color chart was used to determine the color of moist soil samples.

Soil erodibility (or K Factor) indicates the vulnerability of material less than 2 millimeters in size to sheet and rill erosion by water. Values can range from 0.02 (i.e., lowest erosion potential) to 0.69 (i.e., greatest erosion potential).

Table 6. Soil Data Obtained through the Excavation of Soil Pits in the Proposed Project Area.

Feature	Depth (inches)	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture	Slope (%)	K Factor
Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H						
Dual Well Pad	0–16	10YR2/1 (100%)	N/A	Clay Loam	5–8	0.24
	16–20	10YR3/2+ (90%)	N/A	Clay Loam		
	16–20	10YR2/1 (10%)	N/A	Clay Loam		
Access Road	0–15	10YR2/2+ (100%)	N/A	Loam	8–10	0.20
	15–20	10YR3/2+ (100%)	N/A	Loam		
Fort Berthold #148-94-29B-32-1H						
Well Pad	0–19	10YR2/1 (100%)	N/A	Clay Loam	3–5	0.20
	19–20	2.5Y4/2.5 (90%)	N/A	Clay Loam		
	19–20	10YR2/1 (10%)	N/A	Clay Loam		
Access Road	0–19	10YR2/1 (100%)	N/A	Clay Loam	1–2	0.32
	19–20	2.5Y4/2.5 (90%)	N/A	Clay Loam		
	19–20	10YR2/1 (10%)	N/A	Clay Loam		
Shared Access Road						
Shared Access Road	0–5	10YR3/2 (100%)	N/A	Silty Clay Loam	2–4	0.32
	5–16	10YR4/3 (100%)	N/A	Silty Clay		

3.4.3 Conclusions Regarding Soil Erosion Potential

Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H

- The Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad and proposed new access road are dominated by well-drained, moderately to very rapidly permeable soils (see Table 5). Slopes observed within the project area range from approximately 2% to 10%.
- The well pad location has a K Factor of 0.24; the access road K Factor ranges from 0.20 to 0.32. Using the Revised Universal Soil Loss Equation, there could be 2.26 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site would be monitored during and after construction, and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.
- Most of the soils are known to support native grassland vegetation, which may substantially increase the probability for successful and permanent reclamation, provided care is taken in areas where the soils are less than ideal for vegetative growth (NRCS 2009).

Fort Berthold #148-94-29B-32-1H

- The Fort Berthold #148-94-29B-32-1H well pad and proposed new access road are dominated by well-drained, moderately to rapidly permeable soils (see Table 5). However, the topography in the project area does not exceed approximately 5%, so the potential for runoff in an event is low to moderate.
- Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2009).
- The well pad location has a K Factor of 0.20; the access road K Factor ranges from 0.20 to 0.32. Using the Revised Universal Soil Loss Equation, there could be 2.26 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site would be monitored during and after construction, and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.
- Most of the soils are known to support native grassland vegetation, which may substantially increase the probability for successful and permanent reclamation, provided care is taken in areas where the soils are less than ideal for vegetative growth (NRCS 2009).

Shared Access Road

- The Shared Access Road is dominated by well-drained, moderately to rapidly permeable soils (see Table 5). However, the topography in the project area does not exceed approximately 5%, so the potential for runoff in an event is low to moderate.
- Reclamation of vegetative communities should be easily obtainable due to the affinity of native grassland species to this soil type (NRCS 2009).
- The Shared Access Road has a K Factor of 0.32. Using the Revised Universal Soil Loss Equation, there could be 2.26 tons/acre/year of soil loss from the site if it is not properly managed to prevent such loss. The site would be monitored during and after construction, and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.

General

Due to the presence of loamy soils and minimal slopes in the proposed project area, no limitations on construction activities in the project area are anticipated. The soil types are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Proven BMPs are known to significantly reduce erosion of various types of soil, including those in the project area (BLM Instruction Memorandum 2004-124, www.blm.gov/bmp; BLM and USFS 2007; Grah 1997). Topsoil stripped from areas of new construction would be retained for use during reclamation and stored in separate piles on either side of the well pads. This would reduce the potential for topsoil loss over the life of the well. Any areas stripped of vegetation during construction would be reseeded once construction activities have ceased. The implementation of BMPs by the operator is projected to reduce and maintain negligible levels of erosion.

3.5 VEGETATION

The proposed project area occurs in the northwestern Great Plains ecoregion (River Breaks) (USGS 2010), which is a western mixed-grass and short-grass prairie ecosystem (Bryce et al. 1998). Native grasses include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), blue grama (*Bouteloua gracilis*), and western wheatgrass (*Pascopyrum smithii*). Common wetland vegetation includes various sedge species (*Carex* spp.), bulrush (*Scirpus* spp.), and cattails (*Typha* spp.). Common plant species found in woody draws, coulees, and drainages include Juniper (*Juniperus* spp.), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*). Habitat fragmentation as a result of oil and gas development may detrimentally affect plant and subsequently wildlife species; however, the affect of the proposed action on habitat fragmentation would be minimal given the overall habitat area of the Fort Berthold Indian Reservation. Petro-Hunt has committed to implementing interim reclamation of the roads and well pads, immediately following construction and completion, which will serve to reduce the overall impact as a result of habitat fragmentation.

3.5.1 Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H

Vegetation recorded at the proposed Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad and access road included little bluestem, green needlegrass (*Nassella viridula*), cudweed sagewort (*Artemisia ludoviciana*), prairie sagewort (*Artemisia frigida*), western sagewort (*Artemisia campestris*), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*).

3.5.2 Fort Berthold #148-94-29B-32-1H

Vegetation noted at the Fort Berthold #148-94-29B-32-1H well pad and access road included blue grama, purple cone flower (*Echinacea angustifolia*), cudweed sagewort, prairie sagewort, western sagewort, silver buffaloberry, western snowberry, and the invasive Canada thistle (*Cirsium arvense*).

3.5.3 Noxious Weeds and Invasive Vegetation

Noxious weeds have the potential to detrimentally affect public health, ecological stability, and agricultural practices. The North Dakota Century Code (Chapter 63-01.1) recognizes 12 species as noxious; three species are known to exist in Dunn County. Table 7 indicates total acreage for each noxious weed species. Additional information is available from the NRCS Plants Database for North Dakota at http://www.plants.usda.gov.

Table 7. Occupied Area for Recognized Noxious Weeds in Dunn County, North Dakota.

Common Name	Scientific Name	County
		Dunn (acres)
absinth wormwood	*Artemisia absinthium*	39,300
Canada thistle	*Cirsium arvense*	28,500
Dalmatian toadflax	*Linaria dalmatica*	--
diffuse knapweed	*Centaurea diffusa*	--
field bindweed	*Convolvulus arvensis*	--
leafy spurge	*Euphorbia esula*	18,300
musk thistle	*Carduus nutans*	--
purple loosestrife	*Lythrum salicaria*	--
Russian knapweed	*Acroptilon repens*	--
salt cedar	*Tamarix ramosissima*	--
spotted knapweed	*Centaurea stoebe*	--

Source: North Dakota Department of Agriculture 2009.

"Invasive" is a general term used to describe plant species that are not native to a given area, spread rapidly, and have adverse ecological and economic impacts. These species may exhibit high reproductive rates and are usually adapted to occupy a diverse range of habitats otherwise occupied by native species. These species may subsequently out-compete native plant species for resources, causing a reduction in native plant populations and an increase in noxious weed populations.

Evaluation of the existing vegetation during on-site assessment conducted in May and June 2010 indicated one invasive species present at the proposed site, Canada thistle. The potential disturbance is approximately 10.4 acres at the well pads and 23.04 acres for the access roads, for a total of 33.44 acres of disturbance. Removal of existing vegetation may facilitate the spread of invasive species. The APD and this EA require the operator to control noxious weeds throughout the project area. Surface disturbance and vehicular traffic is prohibited outside the approved ROW or the well pad. Areas that are stripped of topsoil must be reseeded and reclaimed at the earliest opportunity. Additionally, certified weed-free straw and seed must be used for all construction, seeding, and reclamation efforts. Construction, operation, and reclamation activities are expected to be carried out in a timely and efficient manner, minimizing adverse impacts and reducing the potential establishment of invasive vegetation species.

3.6 CULTURAL RESOURCES

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations and agreements. The *National Historic Preservation Act of 1966* (16 USC 470 *et seq.*) at Section 106 requires, for any federal, federally assisted or federally licensed undertaking, that the federal agency take into account the effect of that undertaking on any district, site, building, structure or object that is included in the National Register of Historic

Places (National Register) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural and religious significance. Eligibility criteria (36 CFR 60.6) include association with important events or people in our history, distinctive construction or artistic characteristics, and either a record of yielding or a potential to yield information important in prehistory or history. In practice, properties are generally not eligible for listing on the National Register if they lack diagnostic artifacts, subsurface remains or structural features, but those considered eligible are treated as though they were listed on the National Register, even when no formal nomination has been filed. This process of taking into account an undertaking's effect on historic properties is known as "Section 106 review," or more commonly as a cultural resource inventory.

The area of potential effect (APE) of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the *American Indian Religious Freedom Act of 1978* (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the *Native American Graves Protection and Repatriation Act* (NAGPRA, 25 USC 3001 *et seq.*).

Whatever the nature of the cultural resource addressed by a particular statute or tradition, implementing procedures invariably include consultation requirements at various stages of a federal undertaking. The MHA Nation has designated a Tribal Historic Preservation Officer (THPO) by Tribal Council resolution, whose office and functions are certified by the National Park Service. The THPO operates with the same authority exercised in most of the rest of North Dakota by the State Historic Preservation Officer (SHPO). Thus, BIA consults and corresponds with the THPO regarding cultural resources on all projects proposed within the exterior boundaries of the Fort Berthold Reservation.

Cultural resource inventories of these well pads and access roads were conducted by personnel of SWCA Environmental Consultants, using an intensive pedestrian methodology. For the Fort Berthold #148-94-19D-18-1H and Fort Berthold #148-94-30A-31-1H dual well pad project approximately 10.95 acres were inventoried on May 12, 2010 (Lechert *et al.* 2010a). For the Fort Berthold 148-94-29B-32-1H project approximately 33.17 acres were inventoried between April 14 and June 25, 2010 (Lechert *et al.* 2010b). Two previously recorded archaeological sites were revisited, one of which was redefined as a series of isolated finds and the other may possess the quality of integrity and meet at least one of the criteria (36 CFR 60.6) for inclusion on the National Register. As the lead federal agency, and as provided for in 36 CFR 800.5, on the basis of the information provided, BIA reached a determination of **no historic properties affected** for this undertaking, as the potentially eligible site is outside the Area of Potential Effect of these projects. This determination was communicated to the THPO on October 20, 2010, and the THPO concurred on October 25, 2010 (see Part 4).

No cultural significant resources are known to be present in the APE. If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and THPO. Unexpected or inadvertent discoveries of

cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. The presence of qualified cultural resource monitors during construction activities is encouraged.

3.7 PUBLIC HEALTH AND SAFETY

Health and safety concerns include sour gas that could be released as a result of drilling activities, hazards introduced by heavy truck traffic, and hazardous materials used or generated during construction, drilling, and/or production activities.

H_2S is extremely toxic in concentrations above 500 ppm, but it has not been found in measurable quantities in the Three Forks Formation. Before reaching the Bakken, however, drilling would penetrate the Mission Canyon Formation, which is known to contain varying concentrations of H_2S. Contingency plans submitted to the BLM comply fully with relevant portions of Onshore Oil and Gas Order No. 6 to minimize potential for gas leaks during drilling. Emergency response plans protect both the drilling crew and the general public within 1 mile of a well; precautions include automated sampling and monitoring by drilling personnel stationed at each well site.

Because there are no residences within 1 mile of the project area, standard mitigation measures would be applied, and release of H_2S at dangerous concentration levels is very unlikely, no direct impacts from H_2S are anticipated with implementation of the project.

Other potential adverse impacts from construction would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for about 60 days during construction, drilling, and well completion as equipment and vehicles move on and off the site, and then diminish sharply during production operations. If the well proved productive, one small pumper truck would visit the well once a day to check the pump. Three Forks wells typically produce both oil and water at a high rate initially. Gas would be flared initially and intermittently, while oil and produced water would be stored on the well pad in tanks and then hauled out by tankers until the well could be connected to gathering pipelines. Up to four 400-barrel oil tanks and one 400-barrel water tank would be located on the pad inside a berm of impervious compacted subsoil. The berm would be designed to hold 110% of the capacity of the largest tank.

Tanker trips would depend on production, but Petro-Hunt estimates approximately two trucks per day during the initial production period. Trucks for normal production operations would use the existing and proposed access roads. Produced water would be transported to an approved disposal site. All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and BIA roadways and haul permits would be acquired as appropriate.

The EPA specifies chemical reporting requirements under Title III of the Superfund Amendments and Reauthorization Act (SARA), as amended. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the Proposed Action. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported, or disposed of in association with the Proposed Action. All operations, including flaring, would conform to instructions from BIA fire management staff.

A temporary, lined reserve pit would be constructed within the disturbed area of the well pad and constructed so as not to leak, break, or allow discharge and in a way that minimizes the accumulation of precipitation runoff into the pit.

Spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical toilet during drilling. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

3.8 SOCIOECONOMICS

The scope of analysis for social and economic resources includes a discussion of current social and economic data relevant to the Analysis Area and surrounding communities of the Reservation and McKenzie, Dunn, McLean, and Mountrail counties, North Dakota. These counties were chosen for analysis because potential socioeconomic impacts would most likely be realized due to their proximity to the proposed well locations and overlap of the Reservation. These communities are collectively referred to as the Analysis Area.

This section discusses community characteristics such as population, housing, demographics, employment, and economic trends within the Analysis Area. Also included are data relating to the State of North Dakota and the United States, which provide a comparative discussion when compared to the Analysis Area. Information in this section was obtained from various sources including, but not limited to, the U.S. Census Bureau, the U.S. Bureau of Economics, and the North Dakota State government.

3.8.1 Employment

The economy in the state of North Dakota, including the Reservation and four counties in the Analysis Area, has historically depended on agriculture, including grazing and farming. However, energy development and extraction, power generation, and services related to these activities have increased over the last several years. Consequently, service and trade sectors have also become increasingly important; many of the service sector jobs are directly and indirectly associated with oil and gas development. In 2007, total employment in the state of North Dakota was approximately 487,337 (U.S. Bureau of Economic Analysis 2009a). Of this, the largest employers include government and government enterprises employing 16.6% of the labor force (81,218 jobs); health care and social assistance at 11.7% of the labor force (56,990 jobs); and retail trade at 11.3% of the labor force (55,478 jobs) (U.S. Bureau of

Economic Analysis 2009a). Table 8 provides total employment opportunities for the Analysis Area between 2001 and 2007.

Table 8. Total Employment for the Analysis Area and State of North Dakota, 2001 and 2007.

Location	Total Employment (2001)	Total Employment (2007)	Percent Change (+)	Unemployment Rate (2007)
Dunn County	1,941	1,961	1.0	3.8%
McKenzie County	4,164	4,600	10.4	3.1%
McLean County	5,173	5,448	5.3	4.6%
Mountrail County	3,691	3,711	0.5	5.7%
On or Near Fort Berthold Indian Reservation	1,211	1,287*	6.2	71%
North Dakota	448,897	487,337	8.5	3.1%

Source: U.S. Bureau of Economic Analysis 2009a.
* Bureau of Indian Affairs 2005. Represents 2005 data.

Although detailed employment information for the Reservation is not provided by the U.S. Bureau of Economics or the State of North Dakota, residents of the Reservation are employed in similar ventures as those outside the Reservation. Typical employment includes ranching, farming, tribal government, tribal enterprises, schools, federal agencies, and recently, employment related to conventional energy development. The MHA Nation's Four Bears Casino and Lodge, located 4 miles west of New Town, employs approximately 320 people, of which 90% are tribal members (Fort Berthold Housing Authority 2008).

The Fort Berthold Community College, which is tribally chartered to meet the higher education needs of the people of the MHA Nation, had 11 full-time members and 25 adjunct members in academic year 2006–2007. Approximately 73% of the full-time faculty members are of American Indian/Alaska Native descent, approximately 88% of which are enrolled members of the MHA Nation. Additionally, 65% of the part-time faculty members are of American Indian/Alaska Native descent and all (100%) are tribal members.

The BIA publishes biannual reports documenting the Indian service and labor market for the nation. According to the 2005 American Indian Population and Labor Force Report, of the 8,773 tribal members that were eligible for BIA-funded services, 4,381 constituted the total available workforce. Approximately 29%, or 1,287 members, were employed in 2005, indicating a 71% unemployment rate (as a percent of the labor force) for members living on or near the Reservation; 55% of the employed members were living below poverty guidelines. Compared to the 2001 report, 2005 statistics reflect a 6.2% increase in the number of tribal members employed living on or near the Reservation, but unemployment (as a percent of the labor force) has stayed steady at 71% and the percentage of employed people living below the poverty guidelines has increased to 55% (BIA 2005).

3.8.2 Income

Per capita income is often used as a measure of economic performance, but it should be used with changes in earnings for a realistic picture of economic health. Since total personal income includes income from 401(k) plans as well as other non-labor income sources like transfer payments, dividends, and rent, it is possible for per capita income to rise even if the average wage per job declines over time.

The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. According to NAICS standards, per capita personal income for Dunn County was $20,634 in 2000 and $26,440 in 2007, an increase of approximately 28.1%; per capita personal income for McKenzie County was $21,637 in 2000 and $32,927 in 2007, an increase of approximately 52.1%; per capita personal income for McLean County was $23,001 in 2000 and $38,108 in 2007, an increase of approximately 65.6%; per capita personal income for Mountrail County was $23,363 in 2000 and $32,324 in 2007, an increase of approximately 38.3%. These figures compare with a State of North Dakota per capital personal income of $25,105 in 2000 and $36,082 in 2007, an increase of approximately 43.7% from 2000 (U.S. Bureau of Economic Analysis 2009b).

According to a 2008 report published by the Fort Berthold Housing Authority, the average per capita income for the Reservation was $8,855 in 1999, compared to $17,769 for the State and the U.S. average of $21,587 at that time (Fort Berthold Housing Authority 2008).

With the exception of McLean County, counties that overlap the Reservation tend to have per capita incomes and median household incomes below North Dakota statewide averages (Table 9). As presented in Table 9, unemployment rates in all counties, including the Reservation, were equal to or above the state average of 3.1%. Subsequently, Reservation residents and MHA Nation members tend to have per capita incomes and median household incomes below the averages of the encompassing counties, as well as statewide and higher unemployment. Per capita income for residents on or near the Reservation is approximately 28% lower than the statewide average. The median household income reported for the Reservation (i.e., $26,274) is approximately 40% lower than the state median of $43,936. According to the BIA, approximately 55% of tribal members living on or near the Reservation were employed, but living below federal poverty levels (BIA 2005).

Table 9. Income and Unemployment, 2007.

Unit of Analysis	Per Capita Income[1]	Median Household Income	Percent of all People in Poverty[2]
Dunn County	26,440	$37,632	13.5%
McKenzie County	32,927	$41,333	13.8%
McLean County	38,108	$44,421	10.4%
Mountrail County	32,324	$35,981	15.9%
Fort Berthold Indian Reservation[3]	10,291	$26,274	N/A

North Dakota	36,082	$43,936	11.8%

[1] U.S. Bureau of Economic Analysis 2009b
[2] United Stated Department of Agriculture (USDA) 2009
[3] North Dakota State Data Center 2009
N/A = Data not available.

3.8.3 Population

Historic and current population counts for the Analysis Area, compared to the state, are provided below in Table 10. The state population showed little change between the last two census counts (1990–2000), but there were notable changes at the local level. Populations in all four counties have steadily declined in the past. McLean and Dunn counties had a higher rate of population decline among the four counties at 10.5% and 7.8%, respectively. These declines can be attributed to more people moving to metropolitan areas, which are perceived as offering more opportunities for growth. However, population on or near the Reservation has increased approximately 13.3% since 2000. While Native Americans are the predominant group on the Reservation, they are considered the minority in all other areas of North Dakota.

As presented in Table 10, population growth on the Reservation (13.3%) exceeds the overall growth in the state of North Dakota (-0.1%) and four counties in the Analysis Area. This trend in population growth for the Reservation is expected to continue in the next few years (Fort Berthold Housing Authority 2008).

Table 10. Population and Demographics.

County or Reservation	Population in 2008	% of State Population	% Change Between 1990–2000	% Change Between 2000–2008	Predominant Group (%)	Predominant Minority (Percent of Total Minority Population)
Dunn	3,318	0.5	-10.1	-7.8	Caucasian (84.9%)	American Indian (15.1%)
McKenzie	5,674	0.8	-10.1	-1.1	Caucasian (76.3%)	American Indian (23.7%)
McLean	8,337	1.3	-11.0	-10.5	Caucasian (91.3%)	American Indian (8.7%)
Mountrail	6,511	1.0	-5.6	-1.8	Caucasian (62.8%)	American Indian (37.2%)
On or Near Fort Berthold Indian Reservation[1]	11,897	1.8	178.0[2]	13.3[3]	American Indian	Caucasian (~27%)
Statewide	641,481	100	0.005	-0.1	Caucasian	American Indian (8.6%)

Source: U.S. Census Bureau 2009a.
[1] Bureau of Indian Affairs 2005. Population shown reflects the Total enrollment in the Tribe in 2005. 2008 data unavailable. All information related to the Fort Berthold Reservation reflects 2005 data, including state

population. 11,897 reflects tribal enrollment on or near the Reservation. According to the BIA, near the Reservation includes those areas or communities adjacent or contiguous to the Reservation.
[2] Bureau of Indian Affairs 2001. Reflects percent change between 1991 and 2001.
[3] Reflects percent change between 2001 and 2005.

3.8.4 Housing

Workforce-related housing can be a key issue associated with development. Historical information on housing in the four counties in the Analysis Area was obtained from the U.S. Census Bureau, 2000 census. Because the status of the housing market and housing availability changes often, current housing situations can be difficult to characterize quantitatively. Therefore, this section discusses the historical housing market. Table 11 provides housing unit supply estimates in the Analysis Area, including the Reservation and four overlapping counties.

Table 11. Housing Development Data for the Reservation and Encompassing Counties.

Region	Total Housing Units						% Change 2000–2008
	Occupied	Owner Occupied	Renter Occupied	Vacant	Total	Total	
	2000	2000	2000	2000	2000	2008	
Dunn	1,378	1,102	276	587	1,965	1,968	0.1
McKenzie	2,151	1,589	562	568	2,719	2,781	2.2
McLean	3,815	3,135	680	1,449	5,264	5,420	2.9
Mountrail	2,560	1,859	701	878	3,438	3,528	2.6
Reservation	1,908	1,122	786	973	2,881	N/A	N/A
North Dakota	257,152	171,299	85,853	32,525	289,677	313,332	8.2

Source: U.S. Census Bureau n.d.

The Fort Berthold Housing Authority manages a majority of the housing units within the Reservation. Housing typically consists of mutual-help homes built through various government programs, low-rent housing units, and scattered-site homes. Housing for government employees is limited, with a few quarters in Mandaree and White Shield available to Indian Health Service employees in the Four Bears Community and to BIA employees. Private purchase and rental housing are available in New Town. New housing construction has recently increased within much of the Analysis Area, but availability remains low.

Availability and affordability of housing could impact oil and gas development and operations. The number of owner-occupied housing units (1,122) within the Reservation is approximately 58% lower than the average number of owner-occupied housing units found in the four overlapping counties (1,921).

In addition to the relatively low percent change of the total housing units compared to the state average, these four counties are ranked extremely low for both the state and national housing starts and have minimal new housing building permits, as presented in Table 12.

Table 12. Housing Development Data for the Encompassing Counties 2000–2008.

Housing Development	North Dakota County			
	Dunn	McKenzie	McLean	Mountrail
New Private Housing Building Permits 2003–2008	14	14	182	110
Housing Starts-State Rank	51 / 53	15 / 53	21 / 53	17 / 53
Housing Starts-National Rank	3,112 / 3,141	2,498 / 3,141	2,691 / 3,141	2,559 / 3,141

Source: U.S. Census Bureau 2009b, 2009c.

Impacts to socioeconomic resources of the Analysis Area would be minimal and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would generally occur during the construction/drilling and completion phase of the proposed well. Long-term effects would occur during the production phase, should the well prove successful. Impacts would be significant if the affected communities and local government experienced an inability to cope with changes including substantial housing shortages, fiscal problems, or breakdown in social structures and quality of life.

As presented in Table 13, implementation of the proposed wells are anticipated to require between 14 and 28 workers per well in the short term. If the well proves successful, Petro-Hunt would install production facilities and begin long-term production. To ensure successful operations, production activities require between one and four full-time employees to staff operations. It is anticipated that a mix of local and Petro-Hunt employees would work in the Analysis Areas. Therefore, any increase in workers would constitute a minor increase in population in the Analysis Area required for short-term operations and therefore would not create a noticeable increase in demand for services or infrastructure on the Reservation or the communities near the Analysis Area, including McKenzie and Dunn counties. Because the communities likely impacted by the proposed project have experienced a recent decline in population between 2000 and 2008 (as shown in Table 10), with the exception of the Reservation itself, and the historic housing vacancy rate (Table 11) indicates housing availability despite the growth of the population on the Reservation, these communities are able to absorb the projected slight increase in population related to this proposed project. As such, the proposed project would not have measurable impacts on housing availability or community infrastructure in the area. The proposed project also would not result in any identifiable impacts to social conditions and structures within the communities in the Analysis Area.

Table 13. Duration of Employment during Proposed Project Implementation.

Activity	Duration of Activity (Average Days per Well)	Daily Personnel (Average Number per Well)
Construction (access road and well pad)	5–8 days	3–5
Drilling	30–35 days	8–15
Completion/Installation of Facilities	Approx. 10 days	3–8
Production	Ongoing – life of well	1–4

Implementation of the proposed project would likely result in direct and indirect economic benefits associated with industrial and commercial activities in the area, including the Reservation, State of North Dakota, and potentially local communities near the Reservation. Direct impacts would include increased spending by contractors and workers for materials, supplies, food, and lodging in McKenzie and Dunn counties and the surrounding areas, which would be subject to sales and lodging taxes. Other state, local, and Reservation tax payments and fees would be incurred as a result of the implementation of the proposed project, with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those that were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant county and Reservation taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

3.9 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, signed in 1994 by President Clinton, requires agencies advance environmental justice (EJ) by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions, or operations. Meaningful involvement means federal officials actively promote opportunities for public participation, and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Executive Order and is responsible for related legal action. Working criteria for designation of targeted populations are provided in *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (EPA 1998). This guidance uses a statistical approach to consider various geographic areas and scales of analysis to define a particular population's status under Executive Order 12898.

EJ is an evolving concept with potential for disagreement over the scope of analysis and the implications for federal responsiveness. Nevertheless, due to the population numbers, tribal members on the Great Plains qualify for EJ consideration as both a minority and low-income population. Table 14 summarizes relevant data regarding minority and low-income populations for the Analysis Area.

Table 14. Population Breakdown by Region and Race, 2002–2008.

Race	Dunn		McKenzie		McLean		Mountrail		North Dakota	
	2002	2008	2002	2008	2002	2008	2002	2008	2002	2008
Caucasian	3,067	2,818	4,493	4,329	8,313	7,610	4,480	4,086	587,085	586,272
African American	1	2	4	30	1	9	8	27	4,931	6,956
American Indians and Alaska Natives	469	467	1,175	1,230	558	587	1,949	2,277	31,104	35,666
Asian / Pacific Islanders	4	3	4	10	17	19	17	20	4,679	5,095
Two or More Races	1	28	32	75	118	112	68	101	6,311	7,492
All Minorities	475	500	1,215	1,345	694	727	2,042	2,425	47,025	55,209

Source: Northwest Area Foundation 2009.

In 2008, North Dakota's total minority population comprised approximately 55,209, or 8.6% of the state's total population. This is an increase of approximately 17.4% over the 2002 minority population numbers, compared with the 1.2% overall increase for the state's total population during the same time. Although 91.3% of the population in North Dakota is classified as Caucasian, this is a decrease of 1.3% from 2002. Conversely, as presented in Table 14, the minority population of the state has increased steadily since 2002. For example, the American Indian and Alaska Native population increased 0.6%, from 4.9% of the 2002 state population to 5.5% of the 2008 state population. Approximately 70% of Reservation residents are tribal members and 14% of the Dunn County population and 21.6% of the McKenzie County population comprises American Indians and Alaska Natives.

Poverty rate data for the counties in the Analysis Area are summarized in Table 15. The data show that poverty rates for Dunn County, Mountrail County, and the State of North Dakota increased from 2000 to 2007. Poverty rates have decreased for McKenzie and McLean counties.

Table 15. Poverty Rates for the Analysis Area.

Location	2000	2007
Dunn County	13.3%	13.5%
McKenzie County	15.7%	13.8%
McLean County	12.3%	10.4%
Mountrail County	15.7%	15.9%
Fort Berthold Reservation	N/A	N/A
North Dakota	10.4%	11.8%

Source: U.S. Census Bureau 2009d.

Generally, existing oil and gas leasing has already benefited the MHA Nation government and infrastructure from tribal leasing, fees, and taxes. Current oil and gas leasing on the Reservation has also already generated revenue to MHA Nation members who hold surface and/or mineral interests. However, owners of allotted surface within the Analysis Area may not necessarily hold mineral rights. In such cases, surface owners do not receive oil and gas lease or royalty income, and their only related income would be compensation for productive acreage lost to road and well pad construction. Those with mineral interests also may benefit from royalties on commercial production if the wells prove successful. Profitable production rates at proposed locations might lead to exploration and development of additional tracts owned by currently non-benefitting allottees. In addition to increased revenue for land and mineral holders, exploration and development would increase employment on the Reservation with oversight from the Tribal Employment Rights Office, which would help alleviate some of the poverty prevalent on or near the Reservation. Tribal members without either surface or mineral rights would not receive any direct benefits, except through potential employment, should they be hired. Indirect benefits of employment and general tribal gains would be the only potential offsets to negative impacts.

Additional potential impacts to tribes and tribal members include disturbance of cultural resources. There is potential for disproportionate impacts, especially if the impacted tribes and members do not reside within the Reservation and therefore do not share in direct or indirect benefits. This potential is reduced following the surveys of proposed well locations and access road routes and determination by the BIA that there would be no effect to historic properties. Furthermore, nothing is known to be present that qualifies as a TCP or for protection under the American Indian Religious Freedom Act. Potential for disproportionate impacts is further reduced by requirements for immediate work stoppage following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

The proposed project has not been found to pose a threat for significant impact to any other critical element, including air quality, public health and safety, water quality, wetlands, wildlife, soils, or vegetation within the human environment. Through the avoidance of such impacts, no disproportionate impact is expected to low-income or minority populations. The Proposed Action offers many positive consequences for tribal members, while recognizing EJ concerns. Procedures summarized in this document and in the APD are binding and sufficient. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required.

3.10 MITIGATION AND MONITORING

Many protective measures and procedures are described in this document and in the APD. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. Each phase of construction and development through production will be monitored by the BLM, BIA, and representatives of the MHA Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report will be developed by the BLM and BIA that

documents the results of monitoring in order to adapt the projects to eliminate any adverse impact on the environment.

Mitigation actions can be found in general and operator-committed Best Management Practices (BMPs) and mitigation measures. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. The BLM has created a catalog of BMPs that, when properly implemented, can assist industry in a project's design, scheduling, and construction techniques. Petro-Hunt would implement, to the extent possible, the use of BMPs in an effort to mitigate environmental concerns in the planning phase allowing for smoother analysis, and possibly faster project approval. Many of these are required by the BLM when drilling federal or tribal leaseholds and can be found in the surface use plan in the Application for Permits to Drill.

3.10.1 General BMPs

Although largely project-specific, there are a number of BMPs that can, and should, be considered on development projects in general. The following are examples of general BMPs.

- Planning roads and facility sites to minimize visual impacts.
- Using existing roads to the extent possible, upgrading as needed.
- Reducing the size of facility sites and types of roads to minimize surface disturbance.
- Minimizing topsoil removal.
- Stockpiling stripped topsoil and protecting it from erosion until reclamation activities commence. At that time, the soil would be redistributed and reseeded on the disturbed areas. The reclaimed areas would be protected and maintained until the sites are fully stabilized.
- Avoiding removal of, and damage to, trees, shrubs, and groundcover where possible. Trees near construction areas would be marked clearly to ensure that they are not removed.
- Mowing, instead of clearing, a facility or well site to accommodate vehicles or equipment.
- Maintaining buffer strips or using other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Planning for erosion control.
- Storing chemicals properly (including secondary containment).
- Keeping sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a WDEQ-approved sanitary landfill.
- Conducting snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Avoiding or minimizing topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Maintaining buffers around work areas where there is a risk of fire as a result of construction activities.

- Keeping fire extinguishers in all vehicles.
- Planning transportation to reduce vehicle density.
- Posting speed limits on roads.
- Avoiding traveling during wet conditions that could result in excessive rutting.
- Painting facilities a color that would blend with the environment.
- Practicing dust abatement on roads.
- Recontouring disturbed areas to approximate the original contours of the landscape.
- Developing a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.

Petro-Hunt recognizes that there are several BMPs that can be used to mitigate environmental concerns specific to projects associated with below-ground linear alignments, such as those included in the proposed utility corridor. These include:

- following the contour (form and line) of the landscape;
- avoiding locating ROWs on steep slopes;
- sharing common ROWs;
- co-locating multiple lines in the same trench; and
- using natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations;

Petro-Hunt would implement these and/or other BMPs to the extent that they are technically feasible and would add strategic and measurable protection to the project area.

3.10.2 Mitigation and Safety Measures Committed to by Petro-Hunt

3.10.2.1 Dust Control

During construction, a watering truck may be kept on site and the access roads would be watered as necessary, especially during periods of high winds and/or low precipitation.

3.10.2.2 Fire Control

Petro-Hunt would implement fire prevention and control measures including, but not limited to:

- requiring construction crews to carry fire extinguishers in their vehicles and/or equipment;
- training construction crews in the proper use of fire extinguishers; and
- contracting with the local fire district to provide fire protection.

3.10.2.3 Traffic

Construction personnel will stay primarily within the ROW or will follow designated access roads.

3.10.2.4 Wildlife

During an informal Section 7 consultation with the USFWS, the following mitigation measures were agreed upon to reduce the potential impact to protected species.

- Whooping Cranes: If a whooping crane is sighted within 1 mile of the proposed project area, work will be stopped and the USFWS will be notified. Work will start again after the whooping crane has left the area.
- Migratory Birds: If construction will occur during the breeding season (February 1 to July 15), Petro-Hunt will have a biologist survey the project area five days before construction begins or the grass will be maintained by mowing within the project location (access road and well pad) prior to the breeding season to deter migratory birds from nesting in the project area.

3.10.2.5 Cultural Resources

Petro-Hunt recognizes the need to protect cultural resources on the project locations and has committed to prohibiting all project workers from collecting artifacts or disturbing cultural resources in any area under any circumstances.

If cultural resources are discovered during construction or operation, work shall immediately be stopped, the affected site be secured, and BIA and THPO notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.

3.10.2.6 Additional Commitments

Petro-Hunt commits to the following:

- A liner, exhibiting a minimum thickness of 12mm, will be installed in all reserve pits.
- Topsoil will be placed to divert flow away from well pad location to limit the potential of surface contamination
- Reclaim, including revegetate, disturbed areas not actively used for operations/drilling after initial construction
- Erosion control devices that will be implemented as necessary to control surface water contamination from sediment transport.
- The reserve pits will be netted after the initial drilling and will remain in place until final closure.
- A semi-closed loop system will be utilized for all three proposed wells.
- Any free-fluids found in the reserve pit will be immediately removed.
- Utility and electrical lines will be constructed and maintained underground.
- Tanks will be diked with a four foot berm.
- Split the top soil piles so that the piles are stored on separate sides of the proposed well pads.
- Round the corners of the Fort Berthold #148-94-19D-18-1H/Fort Berthold 148-94-30A-31-1H dual well pad.

3.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Removal and consumption of oil and/or gas from the Three Forks Formation would be an irreversible and irretrievable commitment of resources. Other potential resource commitments include land area devoted to the disposal of cutting, soil lost to erosion (i.e., wind and water), unintentionally destroyed or damage cultural resources, wildlife killed as a result of collision with vehicles (e.g., construction machinery and work trucks), and energy expended during construction and operation.

3.12 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Short-term development activities would not detract significantly from long-term productivity and use of the project areas. The construction of access roads and well pad areas would eliminate any forage or habitat use by wildlife and/or livestock. Any allottees to which compensation for land disturbance is owed will be properly compensated for the loss of land use. The initial disturbance area would decrease considerably once the wells were drilled and non-necessary areas had been reclaimed. Rapid reclamation of the project area would facilitate revived wildlife and livestock usage, stabilize soil, and reduce the potential for erosion and sedimentation.

3.13 CUMULATIVE IMPACTS

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. Past and current disturbances near the project area include farming, grazing, roads, and other oil and gas wells. Reasonably foreseeable future impacts must also be considered. Should development of these wells prove productive, it is likely that Petro-Hunt and possibly other operators would pursue additional development in the area. Current farming and ranching activities are expected to continue with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. Undivided interests in the land surface, range permits, and agricultural leases are often held by different tribal members than those holding mineral rights. Over the past several years, exploration has accelerated over the Three Forks Formation. Most of this exploration has taken place outside the Reservation boundary on fee land, but for purposes of cumulative impact analyses, land ownership and the Reservation boundary are immaterial. Although it is the dominant activity currently taking place in the area, oil and gas development is not expected to have more than a minor cumulative effect on land use patterns.

There are no wells within 1 mile of project location. There are (active, confidential, and permitted) wells within 5, 10, and 20 miles of the project area (Tables 16 through 18; Figures 19 and 20).

Table 16. Confidential, Active, and Permitted Wells within a 5-mile Radius of the Project Area.

	Fort Berthold #148-94-19D-18-1H		Fort Berthold #148-94-30A-31-1H		Fort Berthold #148-94-29B-31-1H	
Reservation (on/off)	On	Off	On	Off	On	Off
Confidential Wells	8	0	8	0	9	0
Active Wells	9	0	9	0	9	0
Permitted Wells	0	0	0	0	0	0

Table 17. Confidential, Active, and Permitted Wells within a 10-mile Radius of the Project Area.

	Fort Berthold #148-94-19D-18-1H		Fort Berthold #148-94-30A-31-1H		Fort Berthold #148-94-29B-31-1H	
Reservation (on/off)	On	Off	On	Off	On	Off
Confidential Wells	28	13	28	13	27	11
Active Wells	26	50	26	50	26	38
Permitted Wells	2	0	2	0	2	0

Table 18. Confidential, Active, and Permitted Wells within a 20-mile Radius of the Project Area.

	Fort Berthold #148-94-19D-18-1H		Fort Berthold #148-94-30A-31-1H		Fort Berthold #148-94-29B-31-1H	
Reservation (on/off)	On	Off	On	Off	On	Off
Confidential Wells	68	121	68	121	66	157
Active Wells	58	319	58	319	59	366
Permitted Wells	3	1	3	1	3	1

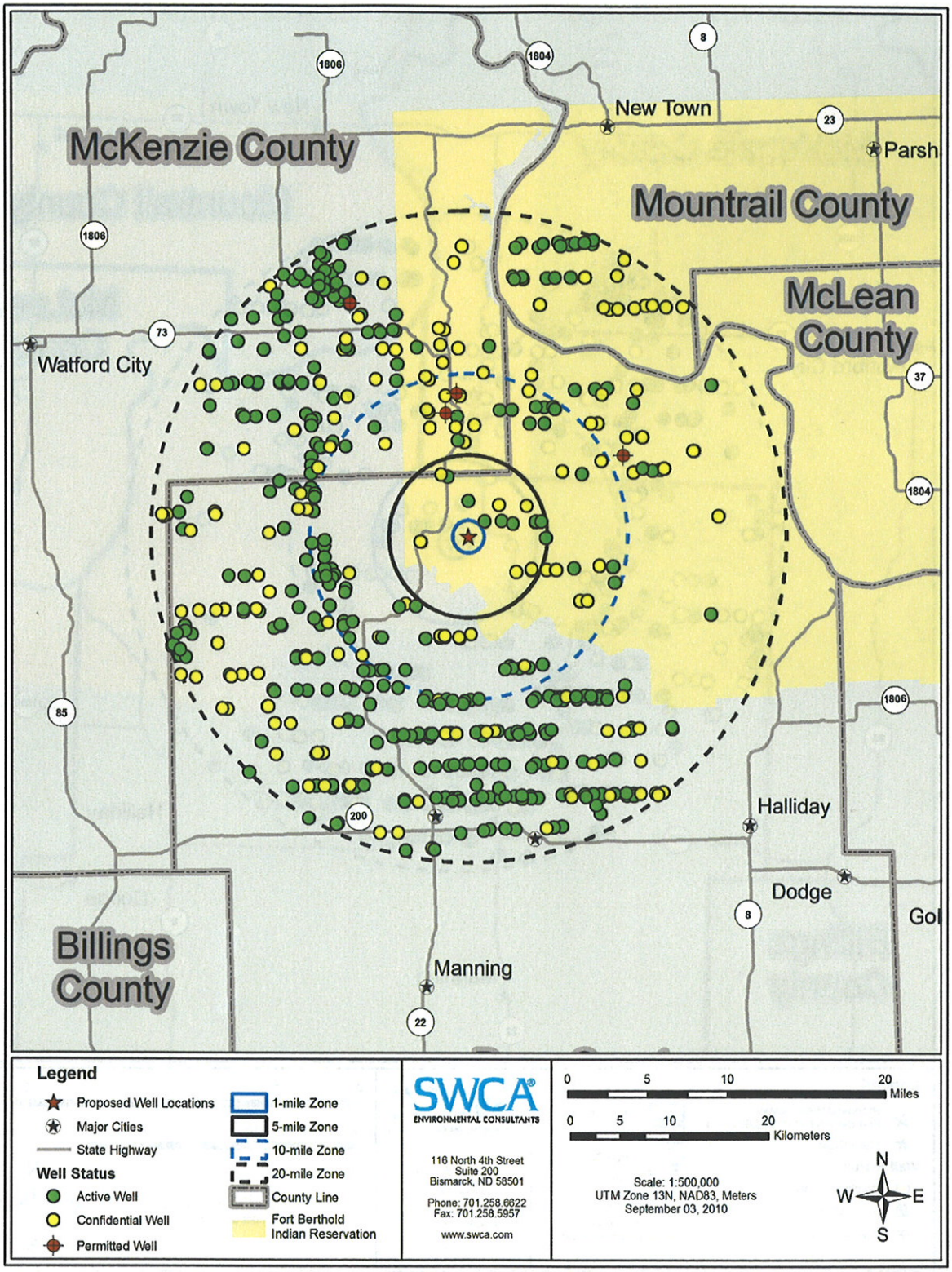

Figure 19. Active, confidential, and permitted wells within a 1-, 5-, 10-, and 20-mile radius of the proposed dual well project location.

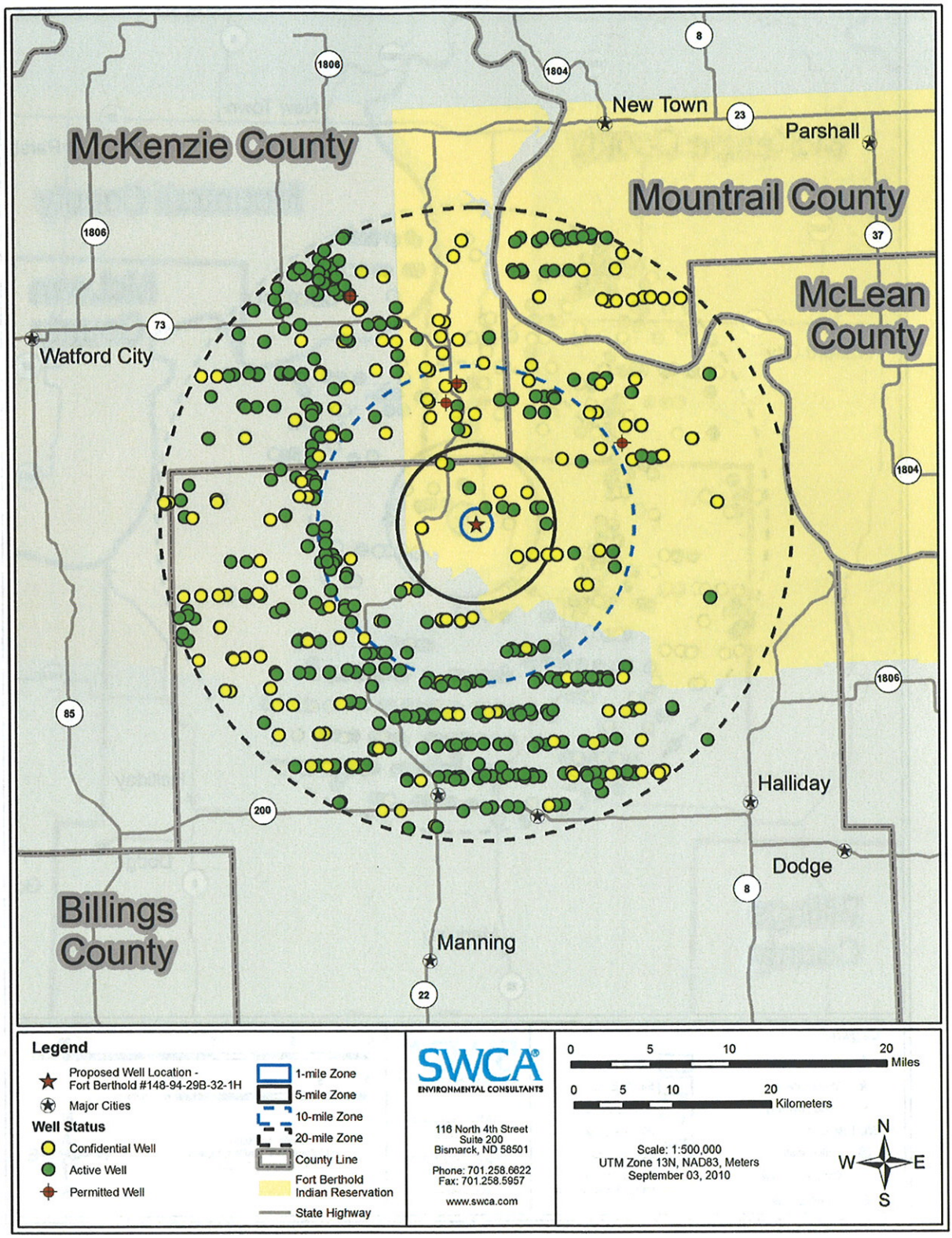

Figure 20. Active, confidential, and permitted wells within a 1-, 5-, 10-, and 20-mile radius of the proposed single well project location.

Within the Reservation and near the proposed project area, development projects remain few and widely dispersed. The project area proposed in this EA would not share access roads with any other proposed wells, but this may change in the future. If successful commercial production is achieved, new exploratory wells may be proposed, though such developments are merely speculation until APDs are submitted to the BLM and BIA for approval. Petro-Hunt has suggested but not yet formally proposed that potentially six to ten more wells may eventually be drilled in the same general area as the proposed project, using many of the same main access roads and minimizing the disturbance as much as possible.

It is anticipated that the pace and level of natural gas development in this region of the state will continue at the current rate over the next few years and contribute to cumulative air quality impacts. The Proposed Action would incrementally contribute to emissions occurring in the region. In general, however, the increase in emissions associated with the Proposed Action—most of which would occur during well construction—would be localized, largely temporary, and limited in comparison with regional emissions.

No surface discharge of water would occur under the Proposed Action, nor would any surface water or groundwater be used during project development. The Proposed Action, when combined with other actions (cattle grazing, other oil and gas development, and agriculture) that are likely to occur in and near the project area in the future, would increase sedimentation and runoff rates. Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in the Independence Point Watershed, but increases in degradation would be reduced by Petro-Hunt's commitment to minimizing disturbance, using erosion control measures as necessary, and implementing BMPs designed to reduce impacts.

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The Proposed Action would create additional lengths of unpaved roadway in the project area. Thus, the Proposed Action would incrementally add to existing and future impacts to soil resources in the general area. However, Petro-Hunt is committed to using BMPs to mitigate these effects. BMPs would include implementing erosion and sedimentation control measures such as installing culverts with energy-dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars alongside slopes, and planting cover crops to stabilize soil following construction and before permanent seeding takes place.

Vegetation resources across the project area could be affected by various activities, including additional energy development and surface disturbance of quality native prairie areas that have been largely undisturbed by development activities, grazing, and agriculture. Indirect impacts to native vegetation may be possible due to soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Continued oil and gas development within the Reservation could result in the loss and further fragmentation of native mixed-grass prairie habitat. Past, present, and reasonably foreseeable future activities in the general area have reduced and would likely continue to reduce the amount of available habitat for listed species.

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action because these resources would be avoided, negating the cumulative impacts to the archaeological record.

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action includes five wells, which would be an additional source of revenue for some residents of the Reservation. Increases in employment would be temporary during the construction, drilling, and completion phases of the proposed project. Therefore, little change in employment would be expected over the long term.

Current impacts from oil and gas-related activities are still fairly dispersed, and the required BMPs would limit potential impacts. No significant negative impacts are expected to affect any critical element of the human environment; impacts would generally be low and mostly temporary. Petro-Hunt has committed to implementing interim reclamation of the roads and well pads immediately following construction and completion. Implementation of both interim and permanent reclamation measures would decrease the magnitude of cumulative impacts.

4.0 CONSULTATION AND COORDINATION

The BIA must continue to make efforts to solicit the opinions and concerns of all stakeholders (Table 19). For the purpose of this EA, a stakeholder is considered any agency, municipality, or individual person that the proposed action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. A scoping letter declaring the locations of the proposed project areas and explaining the actions proposed at the site was sent in advance of this EA to allow stakeholders ample time to submit comments or requests for additional information. Additionally, a copy of this EA should be submitted to all federal agencies with interests either in, near, or potentially affected by the proposed actions.

Table 19. Scoping Comments.

Name	Organization	Comment	Response to Comment
Bagley, Lonny	BLM	No Comment	
Benson, Barry	MHA Nation	No Comment	
Bercier, Marilyn	BIA	No Comment	
Berg, George	NoDak Electric Cooperative, Inc.	No Comment	
Black, Mike	BIA	No Comment	
Boyd, Bill	Midcontinent Cable Company	No Comment	
Brady, Perry	THPO, Three Affiliated Tribes	No Comment	
Brugh, V. Judy	MHA Nation	No Comment	
Cayko, Richard	McKenzie County	No Comment	
Chevance, Nick	National Parks Service	No Comment	
Christenson, Ray	Southwest Water Authority	No Comment	
Cimarosti, Dan	USACE		
Crooke, Patsy	USACE	No Comment	
Danks, Marvin	Fort Berthold Rural Water Director	No Comment	
Dhieux, Joyce	EPA	No Comment	
Dixon, Doug	Montana Dakota Utilities	No Comment	
Erickson, Carroll	Ward County Board of Commissioners	No Comment	
Ferris, Kade	Turtle Mountain Band of Chippewa	No Comment	
Fitzpatrick, Barbara	FEMA	No Comment	
Flores, J.R.	U.S. Department of Agriculture	No Comment	
Fox, Fred	MHA Nation	No Comment	

Name	Organization	Comment	Response to Comment
Glatt, L. David	North Dakota Department of Health	The department believes that environmental impacts from the proposed construction will be minor and can be controlled by proper construction methods.	Petro-Hunt will deploy BMPs to reduce the potential for adverse environmental impact as a result of construction. No discharge will occur into waterbodies which have been assigned a Total Maximum Daily Load effluent limit.
Guzman, Frank	USFS	No Comment	
Hanson, Jesse	North Dakota Parks and Recreation	No known sensitive species are known to occur in the proposed project areas. However, the lack of data should not be construed to indicate that sensitive species do not exist but rather that no data is available. Visual impacts to SH22 should be regulated and reduced to the fullest extent possible.	During the field survey, no sensitive species were observed. A western meadowlark and *Odocoileus* sp. scat were observed within the project areas. The proposed well pads and access road will not visually impact SH22.
Hauck, Reinhard	Dunn County	No Comment	
Hefferman, Dan	EPA	No Comment	
His Horse Is Thunder, Ron	Chairman, Standing Rock Sioux Tribe	No Comment	
Hoffman, Warren	Killdeer, Weydahl Field	No Comment	
Hovda, Roger	Reservation Telephone Cooperative	No Comment	
Hudson-Schenfisch, Julie	McLean County Board of Commissioners	No Comment	
Hynek, David	Chair, Mountrail Board of County Commissioners	No Comment	
Johnson, Harley	New Town Municipal Airport	No Comment	
Kadrmas, Ray	Dunn County	No Comment	
Kuehn, John	Parshall-Hankins Field Airport	No Comment	
Kulas, Cheryl	Indian Affairs Commission	No Comment	

Name	Organization	Comment	Response to Comment
Kyner, Dave	FEMA	FEMA's major concern is if the property is located within a mapped Special Flood Hazard Area, as development in these areas requires further consideration.	The project area is not located within a known perennial flood plain.
Latimer, Tom	Red Willow Great Plains, LLC	No Comment	
Laux, Eric	USACE	No Comment	
Lindemann, Larry	Airport Manager, Barnes County Municipal Airport	No Comment	
Dyke, Steve for McKenna, Mike	North Dakota Game and Fish Department	Our primary concern with oil and gas development is the fragmentation and loss of wildlife habitat associated with construction for the well pads and access roads. We recommend that construction be avoided to the extent possible within native prairie, wooded draws, riparian corridors, and wetland areas.	Construction will not impact wooded draws, riparian corridors, or wetland areas. Native prairie habitat will be impacted however if the wells prove unproductive, Petro-Hunt will work to immediately reclaim the project area to facilitate the recolonization of native plant species.
McPhillips, Kelly	Bureau of Reclamation		
Melhouse, Ronald	Bureau of Reclamation	Proposed oil well sites located in Dunn county could potentially impact rural water lines. Requested work planned on reservation to be coordinated with Mr. Lester Crows Heart.	No rural waterlines are anticipated to be impacted by the construction of either well pad or access road.
Nash, Mike	BLM	No Comment	
Nelson, Richard	U.S. Bureau of Reclamation	No Comment	
Nordquist, Don	Petro-Hunt, LLC	No Comment	
Obenauer, Steve	FAA		
Olson, Frances	McKenzie County	No Comment	

Name	Organization	Comment	Response to Comment
Paaverud, Merl	State Historical Society	Request a copy of site forms and reports to keep the cultural resources archives current for researchers.	See Cultural Resources section.
Packineau, Mervin	MHA Nation	No Comment	
Paulson, Gerald	Western Area Power Administration	No Comment	
Pearson, Myra	Spirit Lake Sioux Tribe	No Comment	
Peterson, Walter	North Dakota Department of Transportation	No Comment	
Poitra, Fred	MHA Nation	No Comment	
Prchal, Doug	North Dakota Parks and Recreation Department	No Comment	
Renschler, Jason	USACE	No Comment.	
Rudolph, Reginald	McLean Electric Cooperative, Inc.	No Comment	
Schelkoph, David	West Plains Electric Cooperative, Inc.	No Comment	
Selvage, Michael	Chairman, Sisseton-Wahpeton Sioux Tribe	No Comment	
Shortbull, Marietta	Fort Berthold Agency	No Comment	
Smith, Heather	EOG Resources, Inc.	No Comment	
Sorensen, Charles	USACE		
Svoboda, Larry	EPA	No Comment	
Sweeney, Paul	Natural Resources Conservation Service	The Farmland Protection Policy Act does not apply to this project. NRCS recommend avoidance of wetlands.	No wetlands will be impacted as a result of the proposed action.
Thompson, Brad	USACE	No USACE land will be impacted. If wetlands are to be filled a proper CWA Section 404 permit is required.	No wetlands will be impacted as a result of the proposed action.
Thorson, Gary	McKenzie Electric Cooperative	No Comment	

Name	Organization	Comment	Response to Comment
Towner, Jeffrey	USFWS	The Service issues concurrence with the affects determinations assigned to the threatened and endangered species (see Section 3.3.2)	The USFWS concurrence letter is attached.
Levings, Marcus	Chairman, MHA Nation	No Comment	
Whitcalfe, Frank	MHA Nation	No Comment	
Williams, Damon	MHA Nation	No Comment	
Wolf, Malcolm	MHA Nation	No Comment	
Chief Missile Engineer	Minot Air Force Base	No Comment	
Garrison Project Office	USACE	No Comment	
Insurance & Hazard Director	FEMA	No Comment	
Land Department	Northern Border Pipeline Company	No Comment	
Manager	Xcel Energy	No Comment	
NAGRPA Office	Three Affiliated Tribes	No Comment	
Natural Resources Department	Three Affiliated Tribes	No Comment	

List of Preparers

An interdisciplinary team contributed to this document, following guidance in Part 1502.6 of Council on Environmental Quality regulations. This document was drafted by SWCA under the direction of the BIA. Information was compiled from various sources within SWCA.

Petro-Hunt Operating Company, LLC

- Jeff Hunt, Regional Land Manager
- Don Nordquist, Senior Landman
- Kent Fetzer, Construction Engineer

SWCA Environmental Consultants

- Chris McLaughlin, Ecologist
  Conducted natural resource surveys for well pads and access roads and prepared the Environmental Assessment.
- Mike Cook, Ecologist/Project Manager
  Conducted natural resource surveys for well pads and access roads and reviewed the Environmental Assessment.
- Josh Ruffo, Biologist
  Conducted natural resource surveys for access roads.
- Stephanie Lechert, Archaeologist
  Conducted cultural resource surveys for well pads and access roads.
- Nelson Klitzka, Archaeologist
  Conducted cultural resource surveys for well pads and access roads.
- Jon Markman, Archaeologist/Field Coordinator
  Conducted cultural resource surveys for well pads and access roads. Completed cultural reports.
- Branden Bornemann, Environmental/GIS Specialist
  Conducted natural resource surveys for well pads and access roads. Created maps and spatially-derived data.
- Joey Sheeley, Planning Specialist
  Calculated Soil K Factors
- Richard Wadleigh, NEPA Expert
  Completed a final review of the EA draft.

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6.0 ACRONYMS

°F	degrees Fahrenheit
APD	application for permit to drill
APE	area of potential effect
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act
CFR	Code of Federal Regulations
EA	environmental assessment
EIS	environmental impact statement
EJ	environmental justice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	finding of no significant impact
GHG	greenhouse gas
HAP	hazardous air pollutant
HUC	hydrologic unit code
MHA Nation	Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation
NAGPRA	Native American Graves Protection and Repatriation Act
NDCC	North Dakota Century Code
NDDH	North Dakota Department of Health
NDIC	North Dakota Industrial Commission
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTL	notice to lessees
PEM	palustrine emergent
ppm	parts per million
ROW	right-of-way
SHPO	State Historic Preservation Officer
TCP	traditional cultural property
THPO	Tribal Historic Preservation Officer
TMD	total measured depth
TVD	total vertical depth
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E.
Aberdeen, South Dakota 57401

OCT 20 2010

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

Perry 'No Tears' Brady, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Brady:

We have considered the potential effects on cultural resources of a dual oil well pad, a single well pad and access road in Dunn County, North Dakota. Approximately 44.12 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the areas depicted in the enclosed reports. Two archaeological sites (32DU317, 32DU318) were revisited and redefined such that site 32DU318 is no longer considered an archaeological site but rather a series of isolated finds. Site 32DU317 may possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for these undertakings, as site 32DU317 is outside the Area of Potential Effect of these projects. Catalogued as **BIA Case Number AAO-1744/FB/10,** the proposed undertakings, locations, and project dimensions are described in the following reports:

Lechert, Stephanie, Jon Markman and Judith Cooper
(2010) A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold 148-94-19D-18-1H and Fort Berthold 148-94-30A-31-1H Dual Well Pad and Access Road, Dunn County, North Dakota. SWCA Environmental Consultants for Petro-Hunt, LLC, Bismarck.

Lechert, Stephanie, Jon Markman, Nelson Klitzka and Judith Cooper
(2010) A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold 148-94-29B-32-1H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Petro-Hunt, LLC, Bismarck.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. The Standard Conditions of Compliance will be adhered to

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

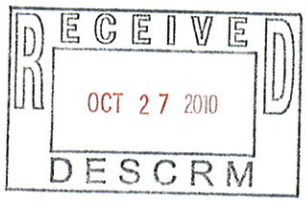
Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

TRIBAL HISTORIC PRESERVATION
Mandan Hidatsa Arikara
Perry 'No Tears' Brady, Director.
404 Frontage Road,
New Town, North Dakota 58763
Ph/701-862-2474 fax/701-862-2490
pbrady@mhanation.com

October 25, 2010



Carson Murdy
Great Plains Regional Office
115 Fourth Avenue S.E.
Aberdeen, South Dakota 57401

Dear Mr. Murdy:

As Director of the Tribal Historic Preservation Office and the Tribe Historical Preservation Officer representing the Mandan Hidatsa Arikara **Nation I Concur with BIA Case Number AAO-1744/FB/10**

Lechert, Stephanie, Jon Markman, and Judith Cooper
(2010) A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold 148-94-19D-18-1H and Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA
Environmental Consultants for Petro-Hunt, LLC, Bismarck.

Lechert, Stephanie, Jon Markman, Nelson Klitzka, and Judith Cooper
(2010) A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold 148-94-29B-32-1H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Petro-Hunt, LLC, Bismarck.

If you have any question please call the office at anytime or contact myself at (701) 421-0547

Sincerely,

Perry 'No Tears' Brady
THPO Director
Mandan Hidatsa, & Arikara Nation,

Cc. file
MC.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

OCT 13 2010

Mr. Michael Cook, Ecologist
SWCA Environmental Consultants
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501

Re: Request for Review and Concurrence on Petro-Hunt Proposed Wells, Ft. Berthold Reservation, Dunn County, North Dakota

Dear Mr. Cook:

This is in response to your June 29, 2010, and subsequent September 29, 2010, email correspondence with Heidi Riddle of my staff, regarding your request for review and concurrence for five proposed exploratory oil and gas wells on three pads proposed to be drilled and completed by Petro-Hunt, LLC (Petro-Hunt) on the Fort Berthold Reservation, Dunn County, North Dakota.

Specific location for the proposed Petro-Hunt single pad is:

Fort Berthold 148-94-29B-32-1H: T. 148 N., R. 94 W., Section 20, Dunn County

Specific location for the proposed Petro-Hunt dual pad is:

Fort Berthold 148-94-19C-18-1H and Fort Berthold 148-94-30A-31-1H: T. 148 N., R. 94 W., Section 19, Dunn County

We offer the following comments under the authority of and in accordance with the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) (MBTA), the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) (NEPA), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) (BGEPA), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds", and the Endangered Species Act (16 U.S.C. 1531 et seq.) (ESA).

Threatened and Endangered Species

In an e-mail dated October 13, 2009, the Bureau of Indian Affairs (BIA) designated SWCA Environmental Consultants (SWCA) to represent the BIA for informal Section 7 consultation under the ESA. Therefore, the U.S. Fish and Wildlife Service (Service) is responding to you as the designated non-Federal representative for the purposes of ESA, and under our other authorities as the entity preparing the NEPA document for adoption by the BIA.

The Service concurs with your "may affect, is not likely to adversely affect" determination for piping plovers, interior least terns, pallid sturgeon, and piping plover designated critical habitat. This concurrence is predicated on Petro-Hunt's placement of the two well pads approximately 2.5 miles from Lake Sakakawea.

The Service concurs with your "may affect, is not likely to adversely affect" determination for whooping cranes. This concurrence is predicated on Petro-Hunt's commitment to stop work on the proposed site if a whooping crane is sighted within one mile of the proposed project area and immediately contacting the Service.

The Service concurs with your "may affect, not likely to adversely affect" determination for gray wolf.

The Service acknowledges your no effect determination for black-footed ferret.

Migratory Birds and Bald and Golden Eagle Protection Act

In an email correspondence on September 22, 2010, to Heidi Riddle of my staff, you clarified that Petro-Hunt will implement the following measures to avoid/minimize take of migratory birds:

- Construction will be done outside of the migratory bird nesting season (Feb. 15-July 15);
- Or, mow/grub the location and access road before the breeding season, if construction will occur in the spring;
- Or, conduct an avian survey five days prior to construction and report any findings to the Service.

The email also states that the nearest known golden eagle nest is located approximately 2.28 miles west-northwest of the pads.

The Service believes that Petro-Hunt's commitment to implement the aforementioned measures does demonstrate compliance with the MBTA and the BGEPA.

Thank you for the opportunity to comment on this EA. If you require further information or the project plans change, please contact me or Heidi Kuska of my staff at (701) 250-4481 or at the letterhead address.

Sincerely,

Jeffrey K. Towner

Jeffrey K. Towner
Field Supervisor
North Dakota Field Office

cc: Bureau of Indian Affairs, Aberdeen
(Attn: Marilyn Bercier)
Bureau of Land Management, Dickinson
ND Game & Fish Department, Bismarck

Notice of Availability and Appeal Rights

Petro-Hunt: Fort Berthold #148-94-19D-18-1H, Fort Berthold #148-94-30A-31-1H, and Fort Berthold #148-94-29B-32-1H

The Bureau of Indian Affairs (BIA) is planning to issue administrative approvals related to installation of three wells as shown on the attached map. Construction by Petro-Hunt is expected to begin in the Fall 2010.

An environmental assessment (EA) determined that proposed activities will not cause significant impacts to the human environment. An environmental impact statement is not required. Contact Howard Bemer, Superintendent at 701-627-4707 for more information and/or copies of the EA and the Finding of No Significant Impact (FONSI).

The FONSI is only a finding on environmental impacts – it is not a decision to proceed with an action and *cannot* be appealed. BIA's decision to proceed with administrative actions *can* be appealed until December 5, 2010, by contacting:

United States Department of the Interior
Office of Hearings and Appeals
Interior Board of Indian Appeals
801 N. Quincy Street, Suite 300, Arlington, Va 22203.

Procedural details are available from the BIA Fort Berthold Agency at 701-627-4707.

Project locations.